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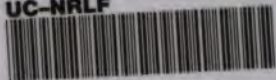
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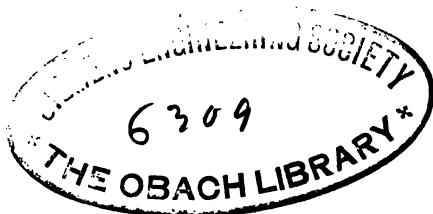
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PATENTS FOR INVENTIONS.

A B R I D G M E N T S

Specifications

RELATING TO THE

PREPARATION OF INDIA-RUBBER AND
GUTTA PERCHA.

PART II.—A.D. 1867-1876.



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PREFACE.

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THE present volume forms Part II. of the series of abridgments of specifications of inventions relating to the "Preparation of India-rubber and Gutta Percha," and embraces the period from A.D. 1867 to 1876, inclusive. Part I. contains the abridgments of this class from the earliest date (A.D. 1791) to the end of the year 1866.

This series comprises inventions relating to mechanical and chemical processes for preparing, cleansing, bleaching, cutting, dissolving, combining, masticating, vulcanizing, hardening, deodorizing, or otherwise treating india-rubber, gutta percha, or their compounds, or similar substances, or substitutes for them.

It also includes the preparation and recovery of some of the solvents employed in their treatment or manufacture, as well as the utilization of waste and the re-use of old materials.

The series likewise embraces the manufacture from the above materials of thread, tubing, sheets, and driving bands or belts, but otherwise it does not include the application of india-rubber, gutta percha, or similar substances, to any particular articles or fabrics unless there appears to be some improvement in the material or compound used or in the mode of treating the manufactured articles or fabrics so as to alter the character of the material or compound.

A detailed list of the various kinds of inventions comprised in the present series of abridgments is furnished by the subject-matter index at the end of this volume.

It should be borne in mind that the abridgments are merely intended to serve as guides to the specifications, which must themselves be consulted for the details of any particular invention.



At the foot of each abridgment is stated the price at which a printed copy of the specification may be purchased at the Patent Office Sale Branch (38, Cursitor Street, Chancery Lane, E.C.).

By means of the "key" at page 20 of the List of Works at the end of this volume, the reader will be able to find out what series of abridgments contains any other class of inventions to which he may desire to refer.

H. READER LACK.

*October, 1884.*

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# PREPARATION OF INDIA RUBBER AND GUTTA PERCHA.

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1867.

A.D. 1867, March 11.—No. 688.

RYDING, FREDERICK.—Hardening vulcanite or dental india-rubber and other similar compounds.

The invention consists in applying heat of any required temperature to every portion of the substance to be worked on by means of a bath of melted metal or alloy. The bath consists of a cauldron, into which is to be put any metal or alloy that will melt to about the consistency of butter at the required temperature without being sufficiently fused to cause evaporation or oxidization of the metal. When the metal is sufficiently heated the case containing the vulcanite or other preparation is then plunged into it.

[*Printed, 4d. No Drawings.*]

A.D. 1867, March 26.—No. 878.

TOUSSAINT, JOSEPH.—(*Provisional protection only.*)—Process for uniting cork or leather.

Pure gutta percha is dissolved by heat and a thin coating is put upon the surface of one of the pieces of cork or leather, the uncoated piece is then placed quickly upon the coated piece whilst the coating is warm. India-rubber may be employed in lieu of gutta percha, or mixed with it, and in some cases vegetable and resinous oils may be mixed with either or both. An important feature is conducting the above process with dry heat, of from seventy to ninety-six degrees of Fahrenheit's thermometer.

"Another mode of conducting the above process is by placing pure gutta percha in powder upon the surfaces of the two pieces of cork or leather to be united, then place them in a stove, and when the powder begins to inflate or expand and give off vapour the coated surfaces of the pieces of material should be quickly pressed together."

[*Printed, 4d. No Drawings.*]

A.D. 1867, April 24.—No. 1193.

CROSSLEY, FRANK. — (*Provisional protection only.*) — "Cutting india-rubber or other materials into strips or thread."

"These improvements consist in so lapping a succession of sheets on the drum of the ordinary thread lathe that two or more knives may be made simultaneously to act on two or more sheets instead of employing one or more knives to act on one sheet only."

[*Printed, 4d. No Drawings.*]

A.D. 1867, April 26.—No. 1212.

GUENIN, EMILE.—(*A communication from Paul Rigollot.*)—"Preparation and application of mustard for curative purposes."

A thin layer of mustard seed or mustard flour is caused to adhere, "by means of any suitable flexible adhesive medium "or cement," to paper, linen, cotton, or other fabric, on which it is applied. The adhesive medium or cement is by preference a solution "obtained by dissolving 1 lb. of "india-rubber in about 20 lb. of essence of petroleum, coal "naphtha, sulphuret of carbon, or other suitable volatile "solvent."

According to the provisional specification the adhesive medium is "composed of india-rubber, one ounce; sulphuret "of carbon, one pound; essence of petroleum, one pound."

[*Printed, 4d. No Drawings.*]

A.D. 1867, April 27.—No. 1219.

MOSELEY, JOSEPH, and MOSELEY, CHARLES.—"Coverings "for rollers which are required to be smooth and elastic."

The covering is made in the form of a tube. The "inner portion of the covering consists of elastic india-rubber or india-rubber and cloth, or of a fibrous compound of india-rubber alone or in combination with elastic rubber or fibrous compound and cloth combined together. The outer surface of the covering is composed of india-rubber mixed with any earthy or metallic substances which will in vulcanizing cause it to harden sufficiently to make it susceptible of being polished, that is to say, the outer surface is converted into the composition known as vulcanite." "The covering when made is placed in or on a mould of the required size so as to produce uniform thickness and smoothness of surface, and then the process of vulcanizing is performed in the usual manner, after which the tube or covering is taken from the mould, polished and cut to the desired length; the covering is then ready for use by placing it on the roller, the surface of which may be made adhesive by cement."

[*Printed, 4d. No Drawings.*]

A.D. 1867, June 17.—No. 1772.

GRAY, MATTHEW.—"Manufacture of electrical telegraphic conductors."

Part of this invention relates to first coating the several wires which are to surround a core wire with a substance adapted in the subsequent twisting of these wires to fill up any space between them.

For this purpose the outer wires pass through a chamber carried by a revolving twisting frame and containing a suitable coating solution. The solution found to answer is composed of gutta percha, bitumen, and tar in proportions such as will be kept in a sufficiently fluid state by the application of heat.

The second part of the invention relates, when coating wires with gutta percha or other insulating substance in a heated state, to means for drawing upon the coated wire at separate parts of its progress through the cooling media before winding it on to the reels to avoid injury to such coating while it is cooling; the fresh coated wire after being in part cooled by cold water in a bath, passes partly round a grooved

pulley of size sufficient to act by its holding to draw the coated wire; the grooved pulley has a positive motion given to it.

[*Printed, 2s. 4d. Drawings.*]

A.D. 1867, August 1.—No. 2224.

QUIN, JAMES.—Preparation of hose pipes and woven fabrics.

Firstly, the yarn or woven fabric is steeped in a solution of about five pounds of corrosive sublimate in one hundred quarts of soft water, it is then washed.

Secondly, a mixture is formed “of about ten parts of caoutchouc, one part of magnesia, two parts of black antimony, one part of sulphur, one half part of asphalt or coal pitch, four parts of oxide of zinc, four parts of calomel, and two parts of red oxide of mercury.” This compound must be heated, and well mixed and masticated together, and then rolled into a thin sheet and dissolved in about twelve parts of coal naphtha or rectified coal tar oil. The solution is laid upon one side of the hose or fabric, and then pressed into the fibres, when dry it is again brushed over with a coating of the compound. When the naphtha or tar oil has evaporated the hose or fabric is placed in a strong iron pan, made to receive water or steam, and subjected to a temperature of about 270° Fah. for about fifteen minutes.

Thirdly, the reverse side of the hose or fabric is coated with a solution composed of about one part of creosote or coal tar oil to five parts of red oxide of mercury to prevent the rotting of the outer part of the fabric.

[*Printed, 4d. No Drawings.*]

A.D. 1867, August 7.—No. 2280.

HAMER, MILTON. — Machinery for india-rubber thread cutting.

This invention relates to machines, “in which the india-rubber is caused to revolve while a cutting tool advances, retreats, and is traversed so as to sever successive strips of the material, and consists,—

“Firstly, in causing the said cutter to advance at an accelerated speed.” A cam of increasing radius acts upon

suitable rods and levers connected to the sliding frame which carries the cutter.

"Secondly, in an arrangement of self-acting apparatus for causing the cutter to traverse for successive cuts." A cam gives motion through the medium of rods or levers to one of two plates, the one loose and the other fast upon the traversing screw. The former of these plates carries short levers capable of turning upon centres in one direction. When they are moved forward to prepare for a traversing by the screw they slip over the other plate, but when they are moved in the other direction they bite or clip its surface and thus cause the screw to revolve."

"Thirdly, in a method of adapting the cutter for different thicknesses of material." The cutter is rendered adjustable by a screw mounted in a nut capable of swivelling in the lever, by which the cutter is forced forward.

[*Printed, 10d. Drawing.*]

A.D. 1867, August 21.—No. 2394.

LUYCKX, GUSTAVE.—"Manufacture of waterproof tubes."

A seamless tube constructed of hemp, flax, or other substance is tanned and then impregnated with caoutchouc in solution, which is introduced into the interior of the tube. A tube of caoutchouc prepared but not fully vulcanized is introduced into the seamless tube. The vulcanization of the interior of the caoutchouc tube is then completed by means of a jet of steam, the tube being exposed to the air during this process.

Another method consists in placing the tube of caoutchouc on the mandril of a circular weaving machine, and weaving upon the caoutchouc a covering of hemp, flax, or other substance, and afterward vulcanizing the caoutchouc as before.

[*Printed, 4d. No Drawings.*]

A.D. 1867, August 28.—No. 2449.

TANDY, GEORGE GRAINGER.—(*Provisional protection only.*)—Preparing vulcanizable compounds, and manufacturing articles therefrom.

The invention consists, 1st, in "preparing compounds of india-rubber and sulphur or other vulcanizable gums or resins used for making ebonite or vulcanite, so as to render them more plastic than can at present be attained." "Hitherto little or no solvent has been used in these compounds in consequence of the great amount of porosity resulting from the escape of the vapours generated during the process of vulcanization." This is overcome by exposing the moulded articles to a sufficiently high temperature to expel the solvent previous to subjecting them to the indurating process, and "by using petroleum spirit not having a higher specific gravity than '630 (although a higher specific gravity may be used) the expulsion is easily effected." "This method is particularly applicable to dentists in the formation of palates."

2ndly. The dough or paste prepared as above described may be used to unite ebonite that may have been broken, "by cleansing or washing the surfaces to be united with bisulphide of carbon, petroleum spirit, or other hydrocarbon."

Coatings of the colored dough are also applied on surfaces of black ebonite.

[*Printed, 4d. No Drawings.*]

A.D. 1867, August 29.—No. 2457.

MACINTOSH, JOHN, and BOGGETT, WILLIAM.—Springs for boots and shoes.

According to one method of making the springs two pieces of unvulcanized sheet india-rubber of the size and shape of the spring required are coated on one side with india-rubber cement. The two cemented sides are then placed together, a strip of tape being inserted between them at their edges to prevent the stitching from giving way. It is preferred to give the springs a ribbed appearance by passing the sheets of india-rubber between ribbed or grooved rollers; or the sheet rubber springs are placed upon a ribbed or grooved metal surface and subjected to pressure whilst warm. The springs are afterwards vulcanized. India-rubber alone or its compounds with sulphur and other materials may be employed but it is preferred to employ the compounds of india-rubber and paraffine or stearic acid described in No. 748, A.D. 1866.

According to another part of the invention the materials, of which the springs are formed, are first made into sheets, which are afterwards cut up to form the springs of the size and shape required. Various methods of forming the sheets are described, in some cases the india-rubber is combined with knitted or looped fabrics, in others the unvulcanized sheet india-rubber is coated with finely divided materials such as flock or powdered pumice stone. Or a coating of flock or other finely divided materials is given to sheet rubber, and when such rubber is vulcanized and coated with cement, it is stretched to the extent of the elasticity required, and any suitable open woven fabric is applied upon the cemented flock.

[*Printed, 4d. No Drawings.*]

A.D. 1867, September 14.—No. 2604.

JEYES, JOHN.—“Material to be used as a substitute for oiled silk, bladders, gut skins, india-rubber, and other water-proof materials, and leather.”

Blotting tissue, or thick paper is covered or saturated with a solution of gutta percha, shellac, coal tar, and methylated spirit. The gutta percha, shellac, and tar are mixed at a temperature of about 212 degrees Fahrenheit, and then the spirit is added. For a cheap material gutta perch and shellac are dissolved in petroleum spirit or other hydrocarbon solvent.

As a substitute for leather blotting paper is used in a series of alternate layers in combination with cotton, linen, or other fabric secured together by the application of the above-mentioned solutions.

Paper pulp is also treated with the solutions, and from it sheets of any required thickness are manufactured.

[*Printed, 4d. No Drawings.*]

A.D. 1867, September 28.—No. 2744.

HAMER, MILTON.—Apparatus for manufacturing india-rubber tubing.

This invention consists in “the production of india-rubber tubing by drawing strips of material through guides or

" guides along the strips so as to bring the edges thereof together."

[*Printed, 10d. Drawing.*]

A.D. 1867, October 23.—No. 2977.

BUGG, FREDERICK JOHN.—Manufacture of pressed leather.

According to this invention it is proposed to employ in the manufacture of pressed leather a cementing material which is not soluble in water, and which is by preference prepared by dissolving one pound of india rubber, four ounces of gutta percha, and two ounces of shellac in three gallons of coal-tar naptha.

[*Printed, 4d. No Drawings.*]

A.D. 1867, November 4.—No. 3108.

LAKE, WILLIAM ROBERT.—(*A communication from Austin Goodyear Day.*)—"Artificial compound chiefly designed for use as a substitute for india-rubber."

The compound is formed by combining together "one or more vegetable fats or oils, one or more mineral oils or resins, one or more gum resins, one or more essential or volatile oils, either with or without resins, or one or more alkalies and sulphur," and then combining this compound with a small proportion of india-rubber or gutta percha, or their equivalents, and vulcanizing the same.

[*Printed, 4d. No Drawings.*]

A.D. 1867, November 6.—No. 3136.

LAKE, WILLIAM ROBERT.—(*A communication from William Augustus Torrey.*)—Manufacture of waterproof fabrics, and articles formed of the same.

The invention consists in applying to a woven fabric, a compound the principal ingredient of which is india-rubber, and also a compound the principal ingredient of which is gutta percha, separately, "and thereby preserving the elastic quality required in belting, hose, packing, and like articles, and protecting them against the injurious operations of heat, oils, alkalies, and acids, and against injury from other causes."

Also in interposing between the inner tube or lining and the outer covering of the hose a layer of any suitable air and waterproof material.

And in winding the fabric upon the mandrel in such a manner that the warp threads will cross or intersect each other.

[*Printed, 8d. Drawing.*]

A.D. 1867, November 8.—No. 3157.

PIGOTT, GEORGE WEST ROYSTON.—Means and apparatus for covering or coating wire with tin, zinc, or other suitable metal or material when in a state of fusion or liquefaction.

Part of this invention relates to "the employment of a combination of parkesine, ebonite, or of hard vulcanized india-rubber with soft india-rubber, or a combination of either of these with cork, asbestos, or talc in either round or rectangular blocks of suitable size and in a state of compression, for the purpose of discharging or stripping from the wire the superfluous fused metal or liquefied material, and also to give a more perfect finish and polish or smoothness the metallized or coated wire."

[*Printed, 4d. No Drawings.*]

A.D. 1867, December 13.—No. 3542.

SINTZENICH, EDWARD REED.—(*A communication from Daniel Reed.*)—(*Provisional protection only.*)—Treating gutta-percha, india-rubber, Honduras gum, and other allied gums for the production of a preparation applicable for various purposes.

"The treatment consists in dissolving such gums in benzine or benzole, or its chemical equivalents, and by adding alcohol in sufficient quantity, in separating the purer portions of the gum from the baky, resinous, and other foreign substances, the gum rising and collecting in the form of a curd more or less solid (by the action of the alcohol) which is to be redissolved thoroughly in benzine or benzole to any consistency for the finer uses." "When the gums thus prepared are to be used for coarse purposes, such as the treatment of clothes, leather, or woven fabrics, or substances to render them waterproof, or when used as a cement or coating or solid substance the treatment consists

“ in redissolving one part of the curd formed in the first or
 “ finer process in benzine or benzole, and one part in bisul-
 “ pheret of carbon or its chemical equivalents, and when both
 “ are thoroughly dissolved the two solutions are mixed
 “ together and are ready for use.”

When used as a substitute for type fullers' earth is added to the solution, and the substance thus formed is pressed into moulds.

Telegraphic wires or conductors are insulated by one or more coats of the material.

When used for dental and surgical purposes the solution is evaporated either with or without moulds and with or without pigments, fullers' earth, or similar materials.

When the solution is used in conjunction with leather as a substitute for leather, the cuttings of leather ground up, cut or scraped into shred are used with the solution.

[*Printed, 4d. No Drawings.*]

1868.

A.D. 1868, February 4.—No. 373.

GRETHER, ERNEST, and BAILEY, MARK.—(*Provisional protection only.*)—"Machinery for cutting discs or washers of
 " india-rubber and other substances."

A number of india-rubber or other cords or cylinders are fitted into tubes, which revolve rapidly round their axes. " All these tubes are placed side by side in one row, and " whatever projects out of them is cut off by a knife, which is " caused to vibrate or travel to and fro in front of and in " close proximity to the tubes." At the back of each tube is a rod, which, after each stroke of the knife, pushes the cord forward a distance equal to the thickness of the discs.

[*Printed, 4d. No Drawings.*]

A.D. 1868, February 18.—No. 526.

DUFILHOL, ADRIEN MARIE.—(*Provisional protection only.*)—" Method of shoeing horses and other beasts of burden."

Instead of fixing the shoe with nails it is proposed to use "an intermediate body of cement, at the same time very adhesive and very elastic." The cement is composed as follows:—"Gutta percha 75 per cent., india rubber 10%, and "gum lac 15%, the whole intimately mixed."

[*Printed, 4d. No Drawings.*]

A.D. 1868, February 18.—No. 535.

PERKINS, WILLIAM, and TANDY, GEORGE GRAINGER.—A "compound applicable for insulating electric conductors and "for such purposes as india-rubber and other vulcanizable "gums are applicable."

The "compound is produced by the combination of anthracene (or paranaphthaline) and naphthaline and compounds "thereof with vulcanizable substances, such as india-rubber, "gutta percha, gum ballata, and other analogous gums and "sulphur."

[*Printed, 4d. No Drawings.*]

A.D. 1868, February 19.—No. 554.

DODGE, GEORGE POMEROY.—(*Provisional protection only.*)—"Manufacture of india-rubber valves, valve seats, and other "similar articles."

The improvements "consist in manufacturing such valves "or sheets from which the same are to be cut of india-rubber "with an interior web of elastic woven fabric."

[*Printed, 4d. No Drawings.*]

A.D. 1868, February 19.—No. 555.

DODGE, GEORGE POMEROY.—(*Provisional protection only.*)—"Packing for the stuffing boxes of steam engines and for "other like purposes."

This invention relates to elastic packing, consisting of india-rubber combined with fibrous material, either with or without an elastic core, which packing is usually manufactured by rolling or twisting hemp, jute, or other fibrous material or woven fabrics into ropes or strands of suitable diameter.

The improved packing is formed as above described, but instead of finishing off at the exterior with hemp or jute, a coating of good sound cotton, canvas, or duck is put over the hemp or jute.

[*Printed, 4d. No Drawings.*]

A.D. 1868, February 24.—No. 609.

MACINTOSH, JOHN, and BOGGETT, WILLIAM.—“*Manufacture and application of elastic goods or fabrics.*”

This invention relates, first, to means of making a fabric elastic by puckering or gathering it previous to combining it with india-rubber, or with a composition of india-rubber and paraffine or stearic acid described in No. 748, A.D. 1866. A sheet of stout vulcanized rubber is employed, though the surface of which the points of steel wire staples are passed, and project in transverse rows. When the sheet rubber is distended the points are pressed into the cloth or fabric placed thereon, the sheet rubber is set free, and in contracting draws the fabric held by the points into puckers. The fabric is then coated with india-rubber cement, or with a sheet of unvulcanized rubber in a soft heated state, which, when vulcanized, will expand and contract to the extent allowed by the puckered fabric. Untanned thin soft leather or thin felt may be puckered up in like manner, but as these materials are to some extent elastic in place of being puckered they may be stretched and coated with rubber, or combined with distended sheet rubber as described in No. 2457, A.D. 1867. In making leggings, leather or knitted or looped tubular fabrics are drawn on or attached to moulds of the shape of the human leg. The fabric is then coated or dipped in a hot solution of the compound before referred to, or it may be otherwise coated. When dry the dipping may be repeated. The leggings are finished by vulcanizing.

Another part of the invention relates to elastic boot laces made either of rubber, or of the compound above referred to combined if desired with an elastic textile fabric.

The invention also relates to elastic fabrics made by coating fibrous threads or yarns with soft rubber or a solution of rubber, such threads being afterwards employed in the manufacture of knitted, looped, plaited, or braided fabrics.

[*Printed, 4d. No Drawings.*]

A.D. 1868, March 9.—No. 815.

HALSEY, WILLIAM HENRY.—“Process for making articles
“from hard rubber and from other substances capable of
“being moulded in dies, and at the same time inlaying or
“inserting in and attaching to such articles metallic and
“other plates.”

The improvements claimed are,—

I. Attaching hinges or joints to articles made from hard rubber, gutta percha, or from any other substance capable of being moulded in dies, by forcing such hard rubber or other substance upon and about or over the hinge plate or equivalent while the article is being moulded, by forming such joints or hinges with projecting points upon their back surfaces or with bevelled or serrated edges, either singly or in combination, so that such hinges or joints shall be firmly and permanently clasped by and secured in the pressed material.

II. Constructing the dies with suitable cavities or recesses to receive the different parts of any joint or hinge, and hold them in place while the article is being pressed.

III. Forming and shaping with projecting points or bevelled or serrated edges one or both of the metallic or other plates, whether of solid or perforated or open pattern, designed to be inlaid or inserted, whether in intaglio, or relieve, or otherwise.

[*Printed, 10d. Drawing.*]

A.D. 1868, March 17.—No. 906.

POISNEL, JEAN MARIE.—“Manufacture of straps, belts,
“bands, pipes, and other articles of india-rubber or similar
“fabric.”

These articles “have been produced by coating a sheet of a
“suitable fabric with a layer of india-rubber on one or both
“sides.” The present invention consists “in substituting
“for the sheet of fabric threads or small cords of suitable
“fibrous material covered with india-rubber or compound of
“india-rubber or similar material. These threads or cords
“are woven, plaited, or otherwise combined together so as
“to produce a fabric of the form and size of the article
“required.” This fabric may be coated on one or both sides
with a layer of india-rubber or similar material.

[*Printed, 4d. No Drawings.*]

A.D. 1868, March 17.—No. 908.

POISNEL, JEAN MARIE.—Manufacture of coverings for the feet to replace wooden shoes or sabots.

India-rubber or india-rubber cuttings containing suitable fibrous material together with well-known agents for producing vulcanization are employed. "This mixture is masticated and heated, and is moulded or rolled to the form and thickness required." The upper is first formed upon a suitable shape, and the sole is then applied and fixed with india-rubber cement. The article is then vulcanized.

[*Printed, 4d. No Drawings.*]

A.D. 1868, March 19.—No. 939.

HOOPER, WILLIAM.—Treating india-rubber, and the manufacture therefrom of fabrics and of insulated telegraph conductors.

When the crude india-rubber has been washed and cleaned before masticating, compressing, grinding, or dissolving it, as the case may be, it is placed in a closed heated chamber and the temperature is raised to about 250 degrees Fahrenheit, at which it is maintained for about two hours. The india-rubber is placed in the heated chamber in sheets as it comes from the rollers of the washing machine. "The india-rubber after this treatment is much easier to masticate or grind." "It also, if compressed without mastication, forms a solid block," "and may be cut into sheets or threads and elastic fabrics manufactured therefrom; and also it is more readily dissolved in solvents than is the crude rubber."

"In the manufacture of insulated telegraphic conductors where a strand of metal wires is insulated partially or wholly by means of a vulcanized coating," the central wire of the strand is coated "with india-rubber or a compound of india-rubber, and into this coating the outer wires of the strand bed themselves, and a solid strand is thus obtained." It is preferred to use a compound of india-rubber such as can be applied to the wire through a die. The composition found suitable consists of a mixture of india-rubber and oxide of zinc.

[*Printed, 4d. No Drawings.*]

A.D. 1868, March 30.—No. 1077.

JOHNSON, JOHN HENRY.—(*A communication from Henry Hauer, and William Howell*).—The treatment of cork, and the manufacture of a compound therefrom.

This invention consists,—firstly, in treating cork “by charring or roasting it so that it may be deprived of the resinous and gummy matter with which the fibrous tissues are more or less impregnated, after which the cork is granulated or torn into small fragments.”

Secondly, of a compound “composed of the cork charred or roasted and granulated as above described and caoutchouc or gutta percha kneaded or worked together so as to become nearly a homogeneous mass, the composition thus produced being available for the construction of light soles and heels for boots and shoes, for being moulded into different forms and objects for articles of utility and ornament, for being rolled into sheets, and used for waterproof coverings, floor-cloths, and for other useful purposes.”

[*Printed, 4d. No Drawings.*]

A.D. 1868, April 13.—No. 1222.

FORSTER, THOMAS.—“Manufacture of compounds of india-rubber, gutta percha, balata, parkesine, solid paraffine or vegetable oils, and vegetable fibre.”

The vegetable fibre is first reduced to a fine powder resembling flour, it is then mixed with india-rubber, gutta percha, balata, parkesine, or with solid paraffine or vegetable oils. “Any vegetable fibre, such as cotton, flax, hemp, manilla jute, or other fibrous material that is capable of being manufactured into paper, or such as waste paper, rags, wood, or sawdust may be employed.” To reduce the fibre it is first cleansed, then macerated in an acid bath; after which it is removed and while wet exposed to heat, it is then washed, dried, and sieved.

[*Printed, 8d. Drawing.*]

A.D. 1868, April 20.—No. 1289.

COLES, GEORGE; JAQUES, JAMES ARCHIBALD; and FAN-SHAW, JOHN AMERICUS.—Manufacture of elastic bands.

This invention "consists in embossing the faces of the bands and rounding the edges."

When cylindrical bands are to be produced the strips of rubber to form the bands are laid out flat between the embossing plates and submitted to pressure.

When the bands are made in the form of disc rings these may be strung on a spindle with metal embossing washers between them, and while thereon they may be vulcanized.

[Printed, 6d. Drawing.]

A.D. 1868, April 21.—No. 1296.

COLES, GEORGE; JAUQUES, JAMES ARCHIBALD; and FANSHAW, JOHN AMERICUS.—Apparatus for producing thin strips or filaments, intended particularly for dividing sheets of india-rubber into threads.

The sheet of india-rubber is passed between pairs or sets of cutters with square edges, which act on the principle of a pair of shears. It is proposed to use a number of these cutters in combination, so that several threads may be cut simultaneously from the same sheet of india-rubber.

[Printed, 10d. Drawing.]

A.D. 1868, April 23.—No. 1336.

ROGERS, JOSEPH.—Utilizing residual products obtained in the treatment of vegetable oils and from the distillation and refining of crude mineral and bituminous products.

A compound, consisting of two parts by weight of the solid residuum resulting from the treatment of vegetable oils, such as cotton seed oil, and one part of the fluid residuum resulting from the rectification of petroleum or of coal oil, is mixed and incorporated with gutta percha or india-rubber or mixtures of the same, for the purpose of obtaining a material suitable for coating telegraphic wires, ships bottoms, metal, wood, masonry, paper, fibrous materials, and woven fabrics.

[Printed, 4d. No Drawings.]

A.D. 1868, May 9.—No. 1522.

MOULTON, STEPHEN.—"Treatment of vulcanized or cured india-rubber for obtaining a substance of a mossy nature suitable for printers' inking rollers, cushions, and other articles."

Vulcanized india-rubber is reduced to powder, and then subjected "to a second vulcanizing heat, the powder or dust " being placed (previous to this second vulcanizing) in a suitable mould according to the particular form or shape of the " article required."

[*Printed, 4d. No Drawings.*]

A.D. 1868, May 27.—No. 1750.

GRAY, MATTHEW.—Manufacture of electric conductors which are covered with insulating composition such as vulcanized india-rubber or its compounds.

This invention consists, firstly, in vulcanizing the successive lengths of the cable as they are joined up in such a manner that the free end for, say, from one to two feet of its length will be left uncured and unchanged, so that the next length can be joined on without difficulty. The vulcanizing vessel is formed with two openings, through which the ends of the cable, when coiled up in the vessel, are allowed to project, so that those portions may not be operated on by the curing process. Or the end of the cable which it is desired to protect may be placed in a tubular vessel contained in the vulcanizing vessel and imbedded in a bad conductor of heat, the tubular vessel may be further protected by a water jacket.

Secondly, when it is required to join two ends that are covered with vulcanized rubber, the insulating compound is cut away for a few inches from each of the ends that require to be joined; the wires are then soldered and covered with uncured rubber compound. "This uncured part of the " insulating compound is then to be placed in a small vulcanizing vessel, through the sides of which the cable will " project, and hot steam being admitted to the interior of the " vessel the change called vulcanizing will then be effected."

[*Printed, 8d. Drawing.*]

A.D. 1868, June 2.—No. 1811.

STERNE, LOUIS.—"Manufacturing driving belts, bands, or " straps from india-rubber and metal united or joined " together during the process of vulcanization."

When a belt is to be made with metal on one side only, a length of rubber prepared for vulcanization and a thin strip of

metal are wound together spirally upon a drum or cylinder; when a sufficient length has been wound they are enclosed by two half cylinders so as to grip or embrace the whole tightly; they are then submitted to the process of vulcanization, whereby the metal and rubber are firmly united. "If the metal and rubber have been previously chemically prepared they are united chemically." Sometimes the belts are made "with metal on both sides, and sometimes with a strip interposed between two strips of rubber."

[*Printed, 8d. Drawing.*]

A.D. 1868, June 5.—No. 1852.

WADSWORTH, JAMES.—"Fabric or composition suitable for soles and heels of boots and shoes, and for other purposes."

"This invention consists in saturating jute, hemp, or other fibre, woven into canvas cloth or in its unmanufactured state, with gutta percha in a soft or liquid state, and pressing layers of such saturated fibre or canvas cloth together whilst warm so as to form a tough fabric of any required thickness."

The gutta percha, with which the jute or hemp is saturated, is dissolved in bi-sulphate of carbon or in mineral naphtha.

This fabric is also manufactured by placing a layer of thin gutta percha between every sheet of the saturated cloth.

In the case of the gutta percha being dissolved in bi-sulphate of carbon, it is preferred to extract such bi-sulphate of carbon from the fabric after being manufactured, by placing the fabric in a heated vessel or chamber, from which the vapour is exhausted by an air pump, and pumped into another vessel so as to subject it to a pressure and thus condense it into the liquid form again.

[*Printed, 4d. No Drawings.*]

A.D. 1868, June 11.—No. 1906.

RODGERS, JOSEPH.—(*Provisional protection only.*)—Construction of belts, straps, or bands for driving machinery.

The first plan proposed is to use one or more thicknesses of gauze or woven wire placed or cemented together and covered

with thin leather, canvas, gutta percha, or india-rubber. The joints of the belt it is preferred to make "what may be termed" as 'lap' and 'butt' joints," the ends being secured by a strip placed over or under, and made of gauze, wire, tin, copper, zinc, or other suitable material, the ends of the belt being tacked or rivetted through the strip.

A second plan proposed is to take a series of longitudinal wires sufficient to form the breadth of the belt and to place them as a warp in a loom; cotton, flax, or other suitable yarn being woven into them as weft. A covering of leather, canvas, gutta-percha, or india-rubber may be used.

A third plan is to cover longitudinal and transverse wires with gutta percha or india-rubber, hemp, cotton, or other suitable yarn previous to their being woven together as warp and weft.

By a fourth plan strips of thin steel or hoop iron are inserted between two thicknesses of leather or canvas, spaces being left between each strip, and the whole is rivetted together between the spaces.

A "fifth plan consists in coating gauze or woven wire with " gutta percha or india-rubber or like substances."

A "sixth plan consists in the use of sheet copper, brass, tin, " or zinc, in lieu of the gauze or woven wire named in the " first plan."

Lastly, where round bands are required, one or more metal wires are used dipped as before named or covered with suitable yarn.

[*Printed, 4d. No Drawings.*]

A.D. 1868, June 11.—No. 1917.

STOCKER, ALEXANDER SOUTHWOOD.—"Improvements appertaining to infants' feeding bottles," "part of which may " also be beneficially employed for other purposes."

Part of this invention relates to preparing sheet india-rubber, which is to be cut into the discs for feeding bottles described in No. 675, A.D. 1868.

The sheet rubber is passed one or more times through or between a pair of rollers, one of which is rigid on its surface and provided with sharp pointed pins or spikes, whilst the surface of the other is rendered elastic by coating it with plain

rubber or other soft material. "The sheet after having been "operated upon will assume a porous-like texture." Sheet rubber may be similarly punctured by the aid of piercing tools fixed in a fly press or otherwise. "Sheet rubber so "prepared will be useful for various purposes."

[*Printed, 4d. No Drawings.*]

A.D. 1868, June 22.—No. 2015.

TAYLOR, GEORGE.—"Construction of boots and shoes, also "means to be used in connection with such construction."

A metal mould is made of a shape similar to the sole of the foot and its length may be from the toe to the inside of the heel. The mould is made with "indents (say $\frac{3}{16}$ ths of an inch "in diameter at distances of $\frac{3}{8}$ ths of an inch apart) in that "portion which extends from the toe to the commencement "of the 'waist.' Flanges are formed round the edges of the "mould." Into the mould is poured liquid caoutchouc, which, when solidified, dried, and removed from the mould, presents on one side a series of nipples resulting from the indents. This india-rubber sole is placed as the under or intermediate sole of the boot or shoe.

[*Printed, 6d. Drawing.*]

A.D. 1868, July 7.—No. 2151.

MAYALL, THOMAS JEFFERSON.—"Manufacture of sheets of "vulcanized india-rubber compounds for forming the soles "of boots and shoes."

Upon a sheet of cotton cloth or other fabric is spread a layer of pure india-rubber dissolved in naphtha, camphine, or other solvent, upon this coating is spread the prepared india-rubber or compound which is to form the vulcanized sheet. The compound preferred consists of—"Four pounds of the "rubber, two pounds of whiting, one pound of sulphur, one "pound of litharge, one half pound of magnesia, one half "pound of lampblack, and two pounds of clay." When the compound has been spread by means of an ordinary coating machine the sheet is again passed between the rolls of the machine in contact with a sheet of some woven fabric or other substance, the surface of the rubber being first sprinkled with French chalk or other suitable material to prevent the

adhesion of the two materials. The pattern of the fabric is by this means impressed upon the surface of the india-rubber compound. The sheet of material is then wound upon a receiving roller and left till vulcanized. The impression cloth is then removed from the vulcanized sheet, leaving a pattern on the latter. The cotton cloth united by the pure rubber solution may then be stripped from the rubber by moistening it with warm water, naphtha, or camphine.

[*Printed, 4d. No Drawings.*]

A.D. 1868, July 8.—No. 2159.

MAYALL, THOMAS JEFFERSON.—“ Manufacture of gas tubing
“ and other articles of india rubber.”

This invention consists—firstly, of a composition, “ composed of linseed oil, and fine litharge, or white lead in the
“ proportion of one quart of oil to one pound of litharge ” well boiled together for coating the interior of india-rubber tubes and other articles.

Secondly, of a composition, consisting of one quart of linseed oil mixed with one half pound of litharge, to which is added a gill of gold size, well boiled together, for coating the exterior surface of tubes and other articles of india-rubber.

Thirdly, of a compound for forming the tubing, consisting of four pounds of india-rubber, two pounds of zinc, three pounds of pipe clay, one pound of shellac, one-quarter of a pound of white resin, and one-half pound of sulphur. “ This
“ compound should be subjected for about two hours to a
“ temperature of two hundred and sixty degrees Fahrenheit,
“ more or less.”

[*Printed, 4d. No Drawings.*]

A.D. 1868, July 8.—No. 2160.

MAYALL, THOMAS JEFFERSON.—“ Electric telegraph cables.”

Part of this invention relates to a compound of india-rubber and gutta percha with other ingredients for forming an exterior casing for cables. Upon a sheet of cotton or other fabric is spread a layer of pure rubber dissolved with camphine or other solvent. Over this rubber is applied the vulcanizing compound consisting of “ one pound of Para rubber, one
“ pound of gutta percha, one pound of zinc, two pounds of

" pipeclay, one quarter of a pound of sulphur, one half pound
 " of shellac, one half pound of French chalk, and two ounces
 " of white resin. This compound should be cured or vulcan-
 " ized for about two and one half hours at a temperature of
 " about two hundred and fifty degrees Fahrenheit." The
 cloth or fabric is then removed from the vulcanized sheet by
 wetting it with hot water, camphine, or naphtha.

[*Printed, 4d. No Drawings.*]

A.D. 1868, July 8.—No. 2167.

LE BLANC, ARMAND JULES.—" Manufacture of belts, bands,
 " or ropes."

This "invention primarily consists in the manufacture of
 " belts, bands, or ropes by means of a fabric, by preference
 " of cotton, coated with caoutchouc and rolled on and into
 " one another; it is then submitted to strong pressure in
 " order to cause the caoutchouc to pass through and into the
 " pores of the fabric; the material is subsequently coated with
 " caoutchouc and vulcanized."

The "invention further consists in the employment for
 " the manufacture of belts, bands, or ropes of all kinds of
 " woven tissues or textile fibres woven or twisted, and
 " impregnated with caoutchouc, gutta percha, or other
 " gummy or resinous materials."

[*Printed, 4d. No Drawings.*]

A.D. 1863, July 9.—No. 2175.

MAYALL, THOMAS JEFFERSON.—Treatment of india-rubber,
 gutta percha, or compounds thereof, and the manufacture of
 type and other articles therefrom.

In treating india-rubber the patentee combines with 8 lbs.
 of that material 5 lbs. of sulphur that has been washed and
 2 lbs. of whiting or black or white lead previously dried. The
 compound is then mixed or ground together and placed in a
 mould of the desired form, pressure is applied so that the
 rubber may fully occupy the parts of such mould to the thick-
 ness desired. The mould, with the contained rubber, is then
 subjected to a progressive heat of from 232° to 296° Fahren-
 heit.

In treating gutta percha the patentee combines 8 lbs. of
 that material cleansed of oil, with 4lbs of washed sulphur,

and 2 lbs. of whiting or white or black lead previously dried. These matters are combined together by grinding, placed in moulds, pressed and subjected to a progressive heat of from 232° to 290° Fahrenheit.

In treating a combination of india-rubber and gutta percha the patentee adds to 4 lbs. of gutta percha from which the oil has previously been removed, 4 lbs. of india rubber, also 4 lbs. of washed sulphur, and 2 lbs. of whiting or black or white lead previously dried. These matters having been thoroughly combined, are pressed into a mould, and then subjected to a progressive heat of from 232° to 295° Fahrenheit.

[*Printed, 4d. No Drawings.*]

A.D. 1868, July 14.—No. 2223.

THOMPSON, JOHN, and INGRAM, JAMES GEORGE.—“Caps
“ for feeding bottles.”

The caps are formed from vulcanizable india-rubber compounds moulded to form in dies by pressure, and subsequently vulcanized.

[*Printed, 6d. Drawing.*]

A.D. 1868, July 20.—No. 2282.

BATES, WILLIAM HENRY, BATES, ALFRED MASON, and FAULKNER, HUGH. — Manufacture of flexible tubes or hose.

This invention relates to articles made of a compound of textile materials or thin wires and india-rubber gutta percha, or other elastic gum. A core of india-rubber is used, which is capable of being stretched so that by reducing its diameter it may be easily withdrawn from the interior of the tube. Upon the core is formed a tube either of sheet rubber, or of compound sheet rubber, or of rubber cloth. The covered core is then placed in a braiding machine supplied with any suitable number of threads or wires according to the intended diameter of the tube and these threads are braided tightly round the core. The core must be coated with india-rubber solution, in which the braiding threads imbed themselves as the operation proceeds. The braided part passes up through a hollow die, whereby any excess of india-rubber solution will be scraped off. From the die the braided core is con-

ducted through one or more heated cylinders or tubes, whereby the solvent will be evaporated, after which it is to be passed through other dies whereby the braided surface will be coated with a solution of india-rubber to any required thickness, and as this coating is laid on the tube must be conducted through heated cylinders to drive off the solvent. "A second " and even more plies of braid and rubber may be laid round " the tube so as to give it additional strength, and after " drawing out the elastic core the article will be ready for " vulcanizing."

[*Printed, 8d. Drawing.*]

A.D. 1868, July 27.—No. 2350.

LOUGHTON, GEORGE RICHARD VEVERS, and JACKSON, EDWARD BLASINI.—"Material for the manufacture of bosses " for flax spinning machinery."

The material consists of from 60 to 80 per cent. of india-rubber and 30 to 50 per cent. of pure golden sulphuret of antimony, which is mixed together into a paste. The bosses are made from this paste and then vulcanized.

[*Printed, 4d. No Drawings.*]

A.D. 1868, July 31.—No. 2404.

DAY, AUSTIN GOODYEAR. — "Artificial compound chiefly " designed for use as a substitute for india-rubber."

The object of this invention is to provide a compound to be used for similar purposes to those for which the compound described in No. 3108, A.D. 1867, was designed.

The present invention consists in combining certain acids with the ingredients which compose the compound described in the prior invention, "for the purpose of enabling the oils " employed therein to better combine together," and also to diminish the quantity of sulphur required.

Various proportions and combinations of the ingredients used may be adopted. The following examples are given:—

For soft or elastic rubber goods, when steam heat is to be employed for vulcanizing, "twenty pounds of linseed oil, " twenty pounds of cotton seed oil, four pounds of coal oil, " twenty-four ounces of sulphuric acid, one pound of bi-carbonate of soda, one pound of nitrate of soda, fifteen pounds

“ of coal tar, five pounds of asphaltum, five pounds of litharge,
 “ two pounds of calcined magnesia, and eight pounds of
 “ sulphur.”

If dry heat is to be used for vulcanizing then thirty ounces of sulphuric acid, two pounds of bi-carbonate of soda, four pounds of litharge and two pounds of calcined magnesia are used instead of the quantities of these materials given above.

For semi-hard rubber goods, “twenty-four pounds of
 “ linseed oil, sixteen pounds of cotton seed oil, four pounds
 “ of castor oil, twelve ounces of sulphuric acid, twelve ounces
 “ of nitric acid, one pound of bi-carbonate of soda, one pound
 “ of sulphate of zinc, one and one half pound of muriate of
 “ tin, eight pounds of coal tar, eight pounds of asphaltum;
 “ two pounds of gutta percha, ten pounds of sulphur, and one
 “ pound of calcined magnesia.”

For hard rubber goods—“Thirty-two pounds of linseed
 “ oil, eight pounds of cotton seed oil, three pounds of castor
 “ oil, one pound of coal oil, twenty-four ounces of nitric acid,
 “ six ounces of muriatic acid, one-half pound of bi-carbonate
 “ of soda, two pounds of muriate of tin, five pounds of coal
 “ tar, five pounds of asphaltum, one pound of gutta percha,
 “ and ten pounds of sulphur.”

The compound is combined with india-rubber in varying proportions. The whole is then vulcanized.

[Printed, *ad.* No Drawings.]

A.D. 1868, August 7.—No. 2471.

HUNT, BRISTOW.—(*A communication from John Haskins.*)—
 Manufacturing india-rubber fabrics, which will resist the
 passage of water (excepting under pressure) and at the same
 time be sufficiently pervious to allow of ventilation.

The fabric “is produced by taking sheets of india-rubber
 “ (of various thicknesses, according to the uses to which they
 “ are to be applied), and piercing or perforating them all
 “ over with minute holes or perforations, the size, number,
 “ and distance apart being also varied according to circum-
 “ stances, but they must be of sufficient size to allow of air
 “ and gases passing through, and to be plainly visible on
 “ holding the fabric up to the light, at the same time that

" they must be sufficiently minute to prevent the passage of water, excepting when pressure is applied."

[*Printed, 6d. Drawing.*]

A.D. 1868, August 11.—No. 2505.

GRAY, MATTHEW, and HAWKINS, FREDERICK.—"Manu-
facturing telegraphic insulated wires and cables."

This invention relates, firstly, to covering wire or strands with an insulating coat of plastic compound, and consists in using "pairs of pressing or squeezing rollers formed with several half-round ring grooves placed side by side, and having, as projections that separate the grooves, blunt edges or compressing rings." Between these rollers are passed a number of wires (to be coated) corresponding with the number of grooves provided in the rollers, and with the wires are passed two ribbons or fillets of the compound rubber, one above and the other below the wires.

"Secondly, to combining covered strands or wires into one cable; the objects being, first, to facilitate the drawing out of the ends of the several wires from the cable to connect them with other lengths of wire or with electrical instruments;" "and, secondly, to effect an economy in the vulcanizing process." Over the wires which have been covered, and while in an uncured state, is dusted French chalk, flour, or other substance that will destroy the tendency to adhesion between the coated wires, which are then laid together to form a cable. The coated wires thus grouped are enclosed in a coating of plastic compound rubber which may be applied by lapping or by grooved rollers. The coated cable is then submitted to heat to produce the "change" required.

[*Printed, 10d. Drawing.*]

A.D. 1868, September 2.—No. 2715.

FORSTER, THOMAS, and HEARTFIELD, JOHN.—"Manu-
facture of porous or spongy substances from india-rubber,
gutta percha, balata, or their compounds."

This invention "consists in combining with india-rubber,
gutta percha, balata, or their compounds, ground animal or
vegetable fibre, together with water or other liquid or

“ substance which will generate vapour in the curing process,
“ or in some cases charcoal or other absorbent material may
“ be used in place of fibre.”

The fibre may be previously ground as flock, or it may be ground together with the rubber compound by any of the usual methods, and when perfectly broken up and combined with the rubber the usual quantity of sulphur is added. The mass is then thoroughly wetted, and, after the surface moisture has been dried off, pressed into sheets or blocks approximating to the desired form when finished. Strips or pieces of the mass so formed are subsequently placed in moulds and vulcanized. The moulds generally used are 16 inches by 12 inches, and 3 inches in depth, and the sheet of rubber, which is 1 inch in thickness, is cut into pieces a little less than 16 inches by 12 inches. The piece of compound is fastened by cement to a thin perforated metal plate, which fits loosely into the mould and allows the air to escape from underneath it.

If a sponge with very coarse pores is required sawdust is used, preferably that of soft woods, such as lime, pear, or deal; if the latter it is boiled in caustic soda and water to remove any resin, then well washed, and soaked in acid and water as described in No. 1222, A.D. 1868.

[*Printed, 4d. No Drawings.*]

A.D. 1868, September 14.—No. 2825.

TURNBULL, HENRY JOHN.—Compositions for preserving and keeping clean the bottoms of iron ships, and iron structures exposed to the action of the atmosphere and water.

The composition for preventing the oxidation of the iron consists of gutta percha and resin dissolved in combination with pine varnish.

The anti-fouling composition is a preparation of phosphorus and shellac.

[*Printed, 4d. No Drawings.*]

A.D. 1868, October 6.—No. 3051.

ASPINALL, JOSEPH.—(*Provisional protection only.*)—“ Im-
“ provements in telegraphic and other ropes or cables,”
“ also applicable in hardening the surface of india-rubber
“ and gutta percha.”

The ropes or cables are enveloped in felt or other fabric saturated with a compound of gutta percha and pitch or rosin. Silica or other similar hard powder is mixed with the gutta percha and pitch or similar composition, or a silicate such as soap-stone is mixed with it, and the silica is afterwards freed by means of an acid, or a solution is applied such as chloride of calcium, which converts the silicate originally employed into a hard stoney substance. The surface of india-rubber and gutta percha is hardened in a similar manner; the surface is washed over with cement or solvent having a silicate such as soapstone mixed with it, an acid or a solution of chloride of calcium or such like salt is then applied.

[Printed, 4d. No Drawings.]

A.D. 1868, October 20.—No. 3215.

FORSTER, THOMAS, and HEARTFIELD, JOHN.—“Improve-
ments in sponging or bath gloves,” partly “applicable to
the joining india-rubber sponge.”

In the manufacture of the gloves sheets of india-rubber sponge are employed. The sheets are cut to suitable forms, the edges of the pieces are then cemented with india-rubber cement made with benzole. “When the cement is dry the
pieces are stuck together, and then to make the joint secure
they are treated with chloride of sulphur diluted with
bi-sulphide of carbon, and thus the india-rubber films
forming the joints are also vulcanized.

“The same method of securely joining pieces of india-
rubber sponge by uniting them with india-rubber cement
and subsequently vulcanizing such joint is also applicable
to the manufacture of other articles.”

[Printed, 4d. No Drawings.]

A.D. 1868, October 21.—No. 3226.

MACMILLAN, CATHERINE.—(*A communication from William Jardine Combe MacMillan.*)—“Protecting iron ships and
other submerged surfaces from corrosion and marine
growths,” and “compositions to be so employed.”

“A compound of gutta percha and resin in equal pro-
portions is employed; these materials are boiled together,

“ using however only so much heat as is necessary to admit
“ for the complete mixture of the ingredients.”

“ The surface of the iron ship having been thoroughly
“ cleaned is heated by means of a coke fire contained in a
“ portable basket; the compound is then applied.” It is
spread by means of small hand metal-spreading rollers or irons,
these are also heated.

To prevent the adhesion of barnacles and marine growths a
second coating is applied, which is a preparation of phosphorus
and shellac.

[*Printed, 4d. No Drawings.*]

A.D. 1868, October 29.—No. 3309.

LIDDELL, WILLIAM HODGSON.—Treating pig skins.

Part of this invention relates to a “system of buffing
“ adapted to closing and filling up the pores of the skin, so
“ that the black body used for filling up shall not run through
“ to the other side.” The black body employed is “a mix-
“ ture of dissolved india-rubber, with about a fourth part of
“ sugar of lead made into a paste by gum dissolved in oil, or
“ spirit, or both, in place of water as hitherto.”

[*Printed, 4d. No Drawings.*]

A.D. 1868, November 21.—No. 3543.

HARRIS, ISAAC BLUE.—(*Provisional protection only.*)—
“ Manufacture of driving bands.”

A core is first formed of woven wire embedded in a sheet of
soft vulcanized india-rubber or gutta percha, or their com-
pounds. One or more layers of this embedded woven wire
may be employed to form the core, the upper face of which is
overlaid with sheet rubber to cover the exposed wire. Round
the core thus formed is lapped a coating of strong cotton
cloth or canvas prepared on one side with the soft rubber or
gutta percha compound, joining the edges of the lapping
cloth on the face of the band, and this joint is covered with
the strip of the compound. The fabric thus formed is sub-
mitted to pressure and to the vulcanizing process.

[*Printed, 4d. No Drawings.*]

A.D. 1868, November 23.—No. 3564.

PHILLIPS, JAMES EDWIN.—(*Provisional protection only*).—
“Improvements in sewing machines, parts of which im-
provements are applicable to other purposes.”

Part of this invention relates to the employment of india-rubber, gutta percha, or compounds thereof, in the construction of gearing in the following manner:—For toothed pinions a boss or foundation wheel is cast in metal with a ring or suitable projections, this foundation wheel is placed in a mould, having suitable cavities formed for the teeth, the space in the mould not occupied by the foundation wheel is filled with india-rubber gutta percha or compounds thereof, it is then submitted to heat to “cure” it and cause the compound to adhere to the boss. Wheels of coarse pitch are cast in metal with smaller teeth than those required, a coating of india-rubber is then applied in a manner similar to that above described. In some cases a band of india-rubber, gutta percha or compounds thereof is placed around the teeth and drawn down between them by bolts and nuts or other means.

[*Printed, 4d. No Drawings.*]

A.D. 1868, December 2.—No. 3661.

ROSTAING, CHARLES SYLVESTER.—(*Provisional protection only*).—Construction of electric telegraph cables.

Part of this invention consists of a “plastic compound” composed of gutta percha melted with from five to ten per cent. of tannin, or of catechu, or of a combination of gutta percha and caoutchouc melted and thoroughly worked together also combined with tannin or catechu,” used for impregnating textile fabrics serving for the construction of electric cables, or for coating them, or for giving the electric fluid conducting wires, for their better insulation, a coating or varnish more or less thick before winding them round the central cord or core.

[*Printed, 6d. Drawing.*]

A.D. 1868, December 29.—No. 3961.

MARSH, JOHN.—(*Provisional protection only*).—“Covering” or capping bottles, jars, and other surfaces.”

India-rubber vulcanized or prepared so as to be really elastic or other suitable elastic material is made into small conical, or sugar loaf, or other suitably shaped caps, these are pressed on to and over any corks or stoppers of the bottles, jars, or surfaces to be capped or covered so as to tightly encompass the same. "The india-rubber coverings for bottles are first of "all made in moulds, then put on mandrels, and finished off by "hand, every one single and every cap moulded separately."

[*Printed, 4d. No Drawings.*]

1869.

A.D. 1869, January 13.—No. 101.

STERNE, LOUIS, JACQUES, JAMES ARCHIBALD, and FAN-SHAW, JOHN AMERICUS.—(*Provisional protection only.*)—"Manufacture of elastic rubbers."

This invention relates to articles made of porous rubber, sometimes called rubber sponge. The object is to prevent the articles from getting out of shape. The porous rubber is combined with a framing of some more rigid substance which will maintain its shape, such for instance as solid vulcanized india-rubber or hard rubber. Bars or pieces of this solid substance are arranged "in any convenient manner, as for "instance in the form of a cross or of a rectangular or oval "frame or skeleton with cross bars or cells; the composition "to form the spongy or porous rubber is placed in the cells "or interstices between the solid parts, and the whole being "submitted to the vulcanizing process all the several parts "will be firmly united together."

[*Printed, 4d. No Drawings.*]

A.D. 1869, February 3.—No. 327.

MACINTOSH JOHN.—"Ornamenting surfaces."

This "invention consists in using a combination of paraffin "or stearic acid, india rubber, and collodion mixed with "metallic powders or gold or silver leaf for the ornamenta- "tion of surfaces, whereby they are rendered waterproof and "not liable to tarnish or oxidation." In some cases the

compound of india-rubber and paraffin or stearic acid is used as a ground, and the metallic powder or leaf is spread thereon.

[*Printed, 4d. No Drawings.*]

A.D. 1869, February 18.—No. 507.

FORSTER, THOMAS, and COW, PETER BRUSEY, junior.—(*Provisional protection only.*)—"Manufacture of india-rubber suction and other pipes, and of hose, buckets, bags, and such like vessels."

The inventors "substitute for the galvanized iron wire coil used in the manufacture of ordinary suction and other hose alternate rings or spirals of rubber having two different quantities of sulphur in them, so that after the operation of steam vulcanizing every alternate ring or spiral will be hard, while the intermediate ones will be flexible."

In manufacturing india-rubber hose, buckets, bags, and such like vessels they "substitute for the cotton or linen fabric ordinarily used for giving strength a material composed of rubber and fibre." This is obtained "by mixing rubber and vegetable fibre (cotton, linen, and flax, by preference) with or without sulphur by means of a pair of rollers moving at unequal speeds until the compound forms a kind of felted paper impervious to water." This compound is rolled into sheets, which are used in the same manner that the cotton or linen fabric is now used.

[*Printed, 4d. No Drawings.*]

A.D. 1869, February 20.—No. 531.

GRAY, MATTHEW.—"Manufacture of covered electrical conductors."

The object of this invention is to reduce the liability which the conducting strands or wires have to lose their central position in the india-rubber envelope during the vulcanizing process. The conducting wire is enclosed first in pure india-rubber, this is overlaid with a plastic compound of india-rubber and sulphur applied by means of the machine described in No. 2505, A.D. 1868, or by other machinery. A tape or strip of cotton or other suitable fabric is next lapped or coiled helically around the india-rubber and sulphur coating while

it is still in a green state. This cloth covering is paid over with a solution of the rubber compound, and the face of a second strip of cloth is prepared with the like solution, this strip of cloth is lapped around the coated wire in the opposite direction to that of the first cloth covering. The conductor thus prepared is submitted to heat in the vulcanizing chamber. The covered conductor is wound on a large hollow iron cylinder or drum (covered on the outside with a soft substance such as cotton) by causing the drum to rotate. This drum is put into the vulcanising chamber. "The drum being hollow and open at the ends will allow of a smaller drum similarly laden with a covered electrical conductor being placed therein, and this second drum may contain a third, and so on."

[Printed, 4d. No Drawings.]

A.D. 1869, April 14.—No. 1157.

CLARK, ALEXANDER MELVILLE. — (*A communication from Manuel Leopold Jonas Lavater.*)—(*Provisional protection only.*)

—"Manufacture of india-rubber nipples for feeding bottles."

"The nipple is formed in hollow moulds made in a single piece of metal, glass, or ceramic material."

India-rubber either pure or a composition "is run in a state of solution into the mould, which is then inverted to allow the material to run off. In this manner a thin film of india-rubber is deposited on the interior surface of the mould."

The operation is repeated as many times as required until the desired thickness is obtained. The hollow central space within the mould is then filled with silicate of magnesia and the whole submitted to a vulcanizing process.

Or the nipple may be made by hand of vulcanized india-rubber, then placed in the mould, and an elastic mandril introduced into the nipple. The mandril consists of a small tube of india-rubber closed at the end inserted in the nipple. Air is then forced into the elastic mandril by the aid of an insufflator, whereby it is expanded so as to press the nipple against the sides of the mould and maintain it in such position. When the mandril is withdrawn the nipple is filled with talc and the whole subjected to a vulcanizing process.

[Printed, 6d. Drawing.]

A.D. 1869, April 24.—No. 1278.

FORSTER, THOMAS, and COW, PETER BRUSEY, junior. —
“Compounds containing india-rubber, gutta percha, or
“balata.”

A compound is made by combining with india-rubber a substance called coorongite. This substance is prepared “by passing it through and through between rollers over which water is running until it works into a plastic mass, and until much of the sand which it contained has been washed out.” It is then passed between hard rollers to crush up the remaining sand, and it is worked up with masticated india-rubber. The compound “may be dissolved in the ordinary india-rubber solvents, although these solvents will not dissolve coorongite itself.”

Sulphur is also mixed with this compound, and it is exposed to heat and in this way vulcanized. “The compound may also be vulcanized by other well-known vulcanizing processes.

“Other substances may be added to the compound of india-rubber and coorongite, such as gutta percha, balata, gums, pigments, mineral powders, and other substances now commonly mixed with india-rubber.

“Gutta percha may also be substituted for india-rubber in the above-mentioned compounds, and so also may balata.”

[*Printed, 4d. No Drawings.*]

A.D. 1869, May 5.—No. 1386.

PHILLIPS, JAMES EDWIN. — “Improvements in sewing machines,” “parts of which improvements are applicable to other machinery.”

Part of this invention relates to the employment of india-rubber, gutta percha, or compounds thereof, in the construction of gearing in the following manner:—For toothed pinions, a boss or foundation wheel is cast in metal with a ring or suitable projections, this foundation wheel is placed in a mould, having suitable cavities formed for the teeth, the space in the mould not occupied by the foundation wheel is filled with india-rubber, gutta percha or compounds thereof, it is then submitted to heat to “cure” it and cause the compound to adhere to the boss. Wheels of coarse pitch are

cast in metal with smaller teeth than those required, a coating of india-rubber is then applied in a manner similar to that above described. In some cases a band of india-rubber, gutta percha or compounds thereof is placed around the teeth and drawn down between them by bolts and nuts or other means.

[*Printed, 1s. 6d. Drawings.*]

A.D. 1869, May 10.—No. 1424.

WOLFGANG, MARK SCHMERL.—“Cricket and other balls.”

A core is first formed of compressed cork united by means of india-rubber solution, a coating of asbestos is then applied, and bound with canvas, cotton, twine, or other suitable material. This is again covered with asbestos, after which a coating of india-rubber mixed with powdered asbestos is applied. The ball is now submitted to heat to cure the rubber.

[*Printed, 6d. Drawing.*]

A.D. 1869, May 15.—No. 1495.

WILKINSON, WILLIAM, and BOSS, MARK.—Embossing, printing, enamelling, and ornamenting various substance, and preparing the materials employed.

Part of this invention relates to transferring printed designs from transfer paper to the surfaces of glass or metal to be embossed the design being printed with Brunswick black and printers' ink mixed together in equal quantities, and any required quantity of pitch may also be mixed therewith, or printers' ink and gutta percha or wax or any combination of these materials.

Another part of the invention relates to a composition for preventing damp or oxidation destroying iron or metallic plates, and consists of two pounds of coal or gas tar, one pound of resin, and one pound of gutta percha.

Another part of the invention relates to a composition applicable to various purposes. It consists of refuse skivings or leather cuttings or old leather torn up and reduced to a fine powder, and india-rubber dissolved in naphtha, a proportionate quantity of cork may be added. It may be heated to any required degree in cylinders “and undergo a similar operation

“ to that of india-rubber and gutta percha, and rolled out into lengths or sheets,” “ and may also be rolled upon any desired fabric in order to fill up the meshes.”

[*Printed, 1s. 4d. Drawing.*]

A.D. 1869, June 28.—No. 1955.

SMITH, GEORGE THOMAS, and CHALLENGER, CHARLES.—
“ Composition applicable to the manufacture of floorcloths, tarpaulins, railway sheets, and other waterproof fabrics.”

1 cwt. of vulcanized india-rubber is ground small, then 4 lbs. of sulphuric acid mixed with 32 lbs. of water are added to it, after the mixture has been well stirred it is covered over for 12 hours; it is then put into a copper with 8 lbs. of naphtha and 3 lbs. of blue vitriol, and boiled down for a sufficient time to incorporate the mass. The mixture is then placed in a tub and washed with cold water; it is then to be passed through rollers and made into sheets, which are to be hung up to dry for two or three weeks. 1 lb. of the dried mixture is added to 1½ lbs. of rags or waste refuse of flax or hemp, and 1½ lbs. of leather ground up, this mixture is passed through rollers several times, ¼ lb. of coloring matter being added during the mixing. “ The compound or material is then to be passed through a series of rollers in order to roll it into small sheets, which are then to be placed in a jacket pan until sufficient sheets are made to produce a length of cloth;” the sheets are then run through a three-bowl calender to the thickness required.

[*Printed, 4d. No Drawings.*]

A.D. 1869, July 1.—No. 1989.

TURNER, ARCHIBALD. — (*Provisional protection only.*) — Utilizing the waste strips of india-rubber which are cut off from the edges of sheet rubber.

The waste strips are wound “ singly on a bobbin from which when the bobbin is placed in the cutting machine the strip is unrolled and brought under the action of a series of circular cutters, which are mounted on a spindle and are driven at a high speed. The knives or cutting instruments are kept wet, and as the strip is fed forward it is by the rapid rotation of the cutters divided up into separate

“ threads, the number depending upon the width of the strip,
“ and these threads are drawn forward by suitable pressure
“ rollers.”

[Printed, 4d. No Drawings.]

A.D. 1869, August 9.—No. 2379.

TURNER, ARCHIBALD.—(*Letters Patent void for want of Final Specification.*)—Utilizing waste strips of india-rubber, and machinery for cutting sheet rubber into thread.

The waste strips, cut off from the edges of sheet rubber, are wound singly on bobbins, or they may be simply placed in a basket or skip. “ The strips are brought singly under the
“ action of a series of circular cutters, whereby the strip is
“ divided up into a number of threads. A wide sheet of
“ rubber (any width) can be cut up into threads in the same
“ manner in a machine of the same construction, which
“ consists of any convenient number of circular cutters
“ according to the width of the strip or sheet to be operated
“ upon. These circular cutters are mounted on a spindle,
“ and are driven at a high speed. The cutting edges of these
“ circular cutters are made to bear against a horizontal bar
“ at the end of a weighted or spring lever.” “ The circular
“ knives or cutters are kept wet by causing water to drip
“ thereon, and as the strip or sheet of rubber is fed forward
“ by a pair of rollers it passes over the horizontal pressing
“ bar, which is forced by the weighted lever or spring against
“ the cutting edges of the rotary knives.”

[Printed, 4d. No Drawings.]

A.D. 1869, November 11.—No. 3254.

JOHNSON, JOHN HENRY.—(*A communication from John Ballou Newbrough and Edward Fagan.*)—“ The treatment of
“ caoutchouc, gutta percha, and analogous gums for the
“ production therefrom of articles of utility and ornament.”

This invention relates to “ producing what is known as hard
“ or vulcanized rubber, and consists in combining iodine with
“ caoutchouc or analogous gum so as to form a composition
“ whereof to mould or shape articles of utility or ornament
“ prior to the same being hardened by vulcanizing, the said
“ composition being in some cases mixed with clay, kaolin,

“ or other mineral substance so as to vary its consistency, “ and wolfram or tungsten oxide being used if desired in combination with the composition so as to prevent the same “ from being over vulcanized during the process of incorporating the gum with the iodine by heat and pressure.”

“ The invention further consists in the application of “ bromine to the above composition ” through the medium of one of the following preparations :—One preparation consists of a solution of bromine in chloroform. A second preparation is made by dissolving in turpentine one part of iodine and two parts of bromine. “ To make a third preparation sulphur is “ boiled in turpentine until the sulphur is decomposed and “ settles with part of the oil to the bottom of the vessel “ in which the materials are treated ; the oil is then poured “ off and the residuum gradually dried by moderate heat “ after being washed if necessary with sulphuric acid. A “ fourth preparation is formed by treating iodine in the same “ manner as sulphur is treated in making the third preparation, except that the turpentine need not be boiled, and “ refuse out from the manufacture of the third preparation “ may be employed.” “ Also in the manufacture of articles “ of utility and ornament by first shaping the same of “ unprepared caoutchouc or analogous gum, and then treating “ them with a solution of bromine in chloroform.”

The invention also relates to a composition for coating metal and other material, “ consisting of caoutchouc or other “ analogous gum dissolved in a solution of bromine and “ chloroform.”

[Printed, 6d. No Drawings.]

A.D. 1869, November 13.—No. 3274.

GEDGE, WILLIAM EDWARD.—(*A communication from Jules Crounieres*).—“ Composition to be used as a coating for “ preserving metal and other surfaces, also as a cement or “ luting.”

It is “ composed essentially of sulphur, coal tar, gutta “ percha, white lead, minium or red lead, and spirit of turpentine, to which may be added resin or pitch, either or “ both according to the application to be made.”

[Printed, 4d. No Drawings.]

A.D. 1869, December 4.—No. 3513.

WALKER, JOSEPH.—(*Provisional protection only.*)—Material to be employed for calico printers' washing blankets "and for other purposes requiring a waterproof material having an absorbent surface."

"India-rubber when in the soft state, that is to say, previously to its being vulcanized, is covered on one surface with powdered cork; the cork by the pressure of rollers being partially embedded in the india-rubber firmly adheres thereto." When a considerable degree of absorbency is required the cork is applied in a granular form.

[*Printed, 4d. No Drawings.*]

1870.

A.D. 1870, January 5.—No. 41.

TRUEMAN, EDWIN THOMAS.—"Machinery for cleansing and preparing gutta percha, india-rubber, and like substances."

The instruments used for dividing or ploughing the materials operated upon are formed of the shape approximately of a double wedge; this is effected by cutting upon the periphery of a suitable metal spindle or cylinder a double-threaded male screw. The threads are made by preference square and each thread runs in a reverse way to and at intervals crosses the other, the result being that wedge-shaped projections are formed upon the spindle, which is placed inside a suitable metal case and is supported on bearings. The internal surface of the metal case is provided with wedge-shaped projections corresponding to those formed upon the spindle. "The gutta percha or other analogous material required to be cleansed may be introduced into the machine by means of a suitable hopper, and the mass is forced by the action of the rotating dividing instrument between the spindle and the inside of the case." The machine works in or under water, or while the materials are submitted to the action of streams or jets of water.

In a modification of the machine, instead of cutting or forming the projections in or upon and in one piece with the spindle or internal surface of the case respectively, the projections are formed by cutting the double-threaded screw used as the dividing instrument in several sections; these are fixed on the spindle, and are separated by suitable washers. The machines may be employed without water, and they may be applied for mixing purposes, and for preparing gutta percha and other analogous materials and their compounds with other substances.

[*Printed, 4d. No Drawings.*]

A.D. 1870, January 31.—No. 272.

DICK, ROBERT.—“Covering and insulating the wires of electric telegraphs.”

The improvements are,—“First. The covering, insulating, and protecting the conducting wires of electric telegraphs with inner coatings formed of vulcanized india-rubber and gutta percha solution (the latter as a cement to the former) by themselves or in conjunction with coatings of gutta percha, as heretofore used.”

“Second. The application and use of thin strips of vulcanized india-rubber coated with gutta percha solution (as a cementing medium) for insulating and covering the conducting wires of electric telegraphs.”

“Third. The application, construction, and use of sectional strips of vulcanized india-rubber coated with gutta percha solution (as a cementing medium) with grooves for receiving the electric telegraph wires, all for forming the inner insulating and protecting coverings of said wires.”

“Fourth. The application of a first insulating and roughening coating of shellac and sawdust, finely ground vulcanized india-rubber, or other equivalent powder material to the conducting wires of electric telegraphs for insuring the adhesion of the subsequent cementing coating of gutta percha solution and vulcanized india-rubber, or of the ordinary coatings (as gutta percha or others) heretofore applied to such wires.”

[*Printed, 1s. Drawings.*]

A.D. 1870, February 1.—No. 295.

BROADHURST, GEORGE, SWINDELLS, JOHN, and KERSHAW, JOHN.—Manufacture of india-rubber sacks for tobacco and other purposes; also elastic webbing for boot gussets; also a partially cut fabric for rollers; and a pierced or cellular fabric intended for the use of woollen cloth manufacturers.

The sacks are made of a length sufficient to admit of being folded up and turned inside out at the mouth.

The webbing is made by sewing a band or sheet of india-rubber between two woven or other fabrics by the aid of sewing machinery.

The cut fabric is made by fixing vulcanized india-rubber of suitable size and thickness to a travelling platform, with which it is passed under a rapidly revolving circular knife, which makes parallel cuts in the rubber to any required depth.

The pierced or cellular fabric is made by punching small holes in a sheet of india-rubber prepared for vulcanizing, and then vulcanizing it to canvas. For punching the sheet rubber a steel plate pierced with suitable sized holes and fitted with centre punches are employed. The sheet of rubber is passed between the plate and the punches and the points of the punches are forced into the holes by a sharp blow.

[*Printed, 1s. 6d. Drawings.*]

A.D. 1870, March 11.—No. 726.

JACKSON, CHARLES.—Improvements in vulcanizers, also applicable for regulating the flow of gas for other purposes.

The vulcanizer consists of a boiler heated by gas. The boiler is made of wrought-iron plates and the lid is provided with a metallic joint so as to render india-rubber packing unnecessary. On the pipe which connects the pressure gauge with the boiler is fixed a chamber, into which open the inlet pipe conveying gas to this chamber, and two outlet pipes conveying gas from the chamber to the burners of the vulcanizer. In the chamber is a flat tube closed at one end and bent into a nearly circular figure. The open end of this flat tube communicates with the pipe of the pressure gauge, and the closed end is free to move. On the closed end is

a lever carrying two valves, situated respectively opposite the outlet pipes, by which gas is conveyed to the burners. By the pressure of steam in the boiler the flat curved tube in the gas chamber tends to uncoil itself, and, acting on the valves, regulates the supply of gas to the burners.

[Printed, 1s. 2d. Drawings.]

A.D. 1870, March 11.—No. 728.

THAMSEN, PETER CHRISTIAN.—(*A communication from Søren Sørensen.*)—"Manufacture of artificial leather."

Leather waste, leather cuttings, leather shavings, or other small bits of leather, either new or old, are reduced to a kind of fibrous pulp by hand labour or by a machine or mill. "This matter or pulp is then kneaded with india-rubber, which is rendered fluid or dissolved in oils or spirits and treated with ammonia." It is preferred to dissolve the india-rubber in oil of turpentine. Previous to mixing the pulp with the india-rubber solution it is preferred to treat the pulp with ammonia vapour. When the mixture of pulp and india-rubber solution has been kneaded to an even mass it is pressed in forms, or by rollers, or otherwise into the required shape. It is afterwards dried and pressed and is then ready for use.

In some cases the india-rubber solution is dispensed with, ammonia alone being employed to act upon the leather pulp. "The quality of this artificial leather can be improved by vulcanizing." For this purpose one part of chloride of sulphur is mixed with forty parts of sulphide of carbon. "In this liquid the leather remains for 5 or 6 minutes, when the intended effect has been produced." "The mixed liquid may also be added to the solution of india-rubber and ammonia."

[Printed, 4d. No Drawings.]

A.D. 1870, March 16.—No. 786.

MOULTON, JOSE.—Manufacture of elastic rolls or tubing for clothes wringers and other purposes.

The first part of the invention consists in the employment of a woven webbing, or one or more strings or strands of any

suitable material, covered or saturated with india-rubber or other analogous gum, wound or extended about a shaft and subsequently vulcanized. A plan for preventing the roll from slipping upon its shaft consists in constructing such shaft between its journals in three parts or rods, and introducing the fibres between and about these rods, and subsequently applying about the whole a mass of rubber and vulcanizing it.

According to the second portion of the invention a strip of woven webbing has applied to its opposite sides two strips of thin vulcanized india-rubber, leaving a narrow space in the middle of the webbing upon each side thereof and between such rubber strips. The strip of webbing is then folded in the centre, and a metallic wire is enclosed in the fold. The strip is then wound spirally about a shaft, from end to end thereof between its journals and the whole is subjected to the vulcanizing process. A modification of this portion of the invention consists in applying transversely to a sheet or between two sheets of vulcanized rubber a layer or range of strands of fibrous material, and subsequently cutting this sheet into ribbons of the desired width at right angles to the length of the strands and forming the strips as before described. String may be used instead of a metallic wire.

"The first portion of the machinery for manufacturing the above rolls consists, first, in a frame suitably constructed for holding and rotating a metallic shaft about which the elastic material is wound, and in combining therewith a series of bunters or hammers for driving the layers or coils of rubber in close contact with each other as they are wound about the shaft, the machine further being provided with means for folding the strips of rubber previous to being wound about the shaft, and for introducing into the fold thus formed a metallic wire or string."

The machinery for detaching elastic rolls or tubes from the vulcanizing moulds consists of two rotating cylindrical rods, termed "cleavers," supported horizontally in a suitable frame in longitudinal alignment with each other, and in such a manner as to be capable of being advanced or retracted with respect to each other and the vulcanizing mould or shell and its contents."

The last portion of the machinery is "for enveloping an elastic roll in its outer case or jacket, which is applied to it

" for the purpose of imparting to it a smooth and perfect " face." The elastic jacket or tube, destined to give the finishing surface to the roll, is inserted in an upright hollow cylinder, a small portion of the jacket being left protruding from the top of the cylinder. The roll is forced into the jacket by a plunger actuated by a rack and pinion.

[*Printed, 1s. Drawings.*]

A.D. 1870, March 24.—No. 863.

FANSHAWE, HENRY RICHARDSON, and SMITH, WILLIAM HENRY.—Treating hides and skins.

Part of the invention relates to treating leather intended for boot soles, uppers, harness and such like purposes, in which imperviousness is required by placing it quite dry in an exhaust vessel, and saturating it with a bituminous compound of coal tar pitch dissolved in common coal tar spirit. To this is added india-rubber well masticated twelve per cent., and gutta percha six per cent. on the weight of the bitumen employed. When color is an object a solution of shell lac is employed instead of the bituminous mixture.

Another part of the invention relates to the treatment of skins such as calf sheep and goat skins with white wax in turpentine, and afterwards with a composition of bleached shell lac and liquor ammonia or borate of soda, and a mixture of stearine with white wax, and what are known as the metallic oxide colors. "In each or any of the above coatings " or compositions the black or colouring can be introduced, " and a small proportion of caoutchouc, or, for great firmness, gutta percha, may be introduced, the caoutchouc or " gutta percha to be blended with the solvent of the materials " forming the coating composition." In some cases as a finishing coating a compound of bisulphide of carbon and ter-chloride of sulphur is employed. The inner surfaces of boot soles and similar articles are coated with a solution on india-rubber and lac blended by a masticator in the proportions of one hundred parts of rubber and fifteen parts ground lac dissolved in one of the usual solvents; or of rubber one hundred parts and of gutta percha twenty parts dissolved as before stated.

[*Printed, 6d. No Drawings.*]

A.D. 1870, March 25.—No. 878.

TRUMAN, EDWIN THOMAS.—“ Treating and preparing gutta percha and other like substances.”

The gutta percha or other material is first cleansed either by the process described in No. 2052, A.D. 1860, or preferably by the process described in No. 41, A.D. 1870, or it may be cleansed by the ordinary cleansing processes hitherto used, and in some instances materials comparatively free from dirt may be used without cleansing.

The material when cleansed, if it requires cleansing, is placed in a machine consisting of a cylindrical metal case, in which works a screw (having by preference) three blades. The case has on the top of it a large open hopper, and it has also an exit opening at one end, towards which the material is forced by the action of the screw. To this opening is attached a bent tube, which conducts the material back into the hopper and so delivers it again to the action of the screw. This operation is repeated over and over again. In an early part of the operation the tube or case is highly heated, the result being that the moisture contained in the pores of the gum is converted into steam and is ready to be liberated directly the gutta percha reaches the opening of the tube leading back into the case. The application of heat is continued until all the moisture is driven off, the heat is then withdrawn and the operation is continued with the tube cool until the air and gas contained in the gum are driven off and the gutta percha passes out of the tube desiccated and consolidated.

[*Printed, 6d. No Drawings.*]

A.D. 1870, April 4.—No. 982.

MACCARTNEY, WILLIAM NEWTON.—“ Process for dissolving or reducing crude or manufactured india-rubber.”

This invention is specially applicable for utilizing waste vulcanized or ebonized india-rubber, to reduce which it is immersed in any of the ordinary solvents of crude india-rubber until it has become softened and can be easily cut, torn, or ground into small pieces. It is then placed in a still with variable proportions of camphor to the india-rubber, some india-rubber requiring more and some less of the camphor.

"Heat is then applied and the contents of the still kept in agitation, when the india-rubber will be dissolved, and the solvent passed over either in vacuo or under the pressure of the atmosphere. The liquid solvent which is distilled over from the rubber is suitable for dissolving other waste rubber." If all the camphor is to be exhausted from the india-rubber, alcohol is added to the hot solution. "Upon cooling the alcohol is separated from the india-rubber and is then drawn off, when the camphor may be separated from the alcohol by being thrown down by the addition of water, or by distilling the alcohol."

"Camphor or any of its allied substances, such as artificial camphor, camphine, camphin, oil of camphor, camphoric acid, camphrone, camphol, campholic acid, or any of the camphorates, or camphoric ethers," may be used for the purposes of this invention.

[*Printed, 4d. No Drawings.*]

A.D. 1870, April 14.—No. 1095.

STEWART, LAWRENCE.—Wheels for carriages, waggons, carts, and other vehicles.

The wheels are made of vulcanized caoutchouc, known as vulcanite, of which the whole of the wheels are made, or parts only may be made of vulcanite the other parts being of wood metal or other material. When made wholly of vulcanite they are manufactured by pressing the caoutchouc, mixed with sulphur or other material, in a plastic state in moulds of the requisite shape. Each wheel may be moulded in one piece, or several moulds may be employed for forming the wheel in different pieces or divisions. But it is preferred to construct a light framework of any suitable material of the form and dimensions of the wheels required, and to lay the plastic caoutchouc over it to any depth or thickness required. The caoutchouc composition is afterwards vulcanized.

[*Printed, 10d. Drawing.*]

A.D. 1870, April 20.—No. 1155.

JOHNSON, JOHN HENRY.—(*A communication from John Ballou Newbrough.*)—A hardening composition called "acid resin," and its employment with india-rubber, gutta percha, gums, and oils.

This invention consists, "firstly, in subjecting turpentine to the action of sulphuric or other equivalent acid, and applying heat to the mixture until upon cooling the product assumes the consistency of honey, or if the heat be further continued the product will be obtained in a brittle or pulverizable condition; secondly, in the employment of the gelatinous or hard products thus obtained in conjunction with caoutchouc or other similar gums, or with gutta percha, so as to produce a material capable of being moulded and solidified."

Instead of employing turpentine only with the acid "other substances may in part be substituted, viz., benzole or turpentine, to which about one-fourth part by weight of resin or asphaltum has been added."

"Instead of mixing the acid resin with caoutchouc it may for certain purposes be mixed with either linseed or rape oil, and the product thus obtained when submitted to a temperature of from 230° to 300° Fahrenheit will become hard. The acid resin may be combined with sulphur, iodine, bromine, or phosphorus, and in such combination may be employed for the production of compounds with all the resinous gums so as to produce a hardened compound or compounds."

[Printed, 4d. No Drawings.]

A.D. 1870, May 7.—No. 1315.

GUENIN, EMILE.—(*A communication from Paul Rigollo*).

"—Manufacture of mustard and other plasters," and "machinery for the same."

This invention relates to improvements on No. 1212, A.D. 1867. Referring to that Specification the patentee says,—"I there described the mustard flour (deprived of its oil) as being caused to adhere to the paper or other surface on which it is applied by the aid of a solution of india-rubber and a mixture of equal parts of sulphuret of carbon and essence of petroleum." "According to the present improvements I substitute benzine for the sulphuret of carbon, the solution being prepared in the following manner:—I place, for example, about $\frac{1}{4}$ lb. of Para india-rubber in sheets (this being the only kind suitable for the purpose) previously masticated by passing between toothed

“ rollers in a closed apparatus, and digest it at a temperature of from 80 to 90 degrees Fahrenheit in about 5 or 6 lbs. of benzine having a density of about 17 oz. per pint. This operation is continued for twenty-four hours, after which I introduce the mass into a tinned metal apparatus provided with a stirrer similar to a churn, and well agitate the contents, simultaneously with which I add in small quantities at a time about 15 lbs. of essence of petroleum.” “I pass the viscous liquid obtained through a wire sieve when it is ready for immediate use.”

[*Printed, 10d. Drawing.*]

A.D. 1870, May 16.—No. 1401.

JOHNSON, JOHN HENRY.—(*A communication from Eliza Dexter Murfey.*)—“ Manufacture of bearings, slides, and packings for steam engines and other machinery.”

Paper or other like material is reduced to a pulpy condition and then pressed in a mould until perfectly hard. “In some instances the pulp is thoroughly saturated before or after its introduction into the mould with paraffine, and is then condensed or subjected to a pressure, the moulds if necessary being heated, so that the lubricant is preserved in a liquid state until thoroughly absorbed. In many cases it is best to add a solution or mixture of rubber caoutchouc, or other soluble material, to the pulp, or to add both rubber and paraffine, the product being thereby rendered more serviceable as a bearing.”

[*Printed, 4d. No Drawings.*]

A.D. 1870, June 4.—No. 1626.

SPILL, DANIEL.—Compounds for insulating telegraph wires, manufacturing flexible tubing, and other purposes.

Flexible and plastic compounds are produced by combining one or more gums, resins, or gum resins, with camphor, or with caoutchouc and camphor, or with balsams, or fatty or volatile oils. The gums, resins, or gum resins may be dissolved in the cold way by any of their solvents, and then incorporated with gutta percha or caoutchouc, or with diluents, such combinations being made by grinding rolls or masticators, or by heat and stirring alone.

[*Printed, 4d. No Drawings.*]

A.D. 1870, June 18.—No. 1752.

EWING, JOHN ORR, and COLEMAN, JOSEPH JAMES.—
“Treating or preparing certain lubricating oils.”

The object of this invention is to impart to refined mineral lubricating oils obtained from crude shale oil, which is distilled from shale at a low red heat, the quality known as “body.” This is effected by combining caoutchouc with the oils, by digesting the oils with the caoutchouc by the aid of heat, or by violently agitating the oils and the caoutchouc together, or both these methods may be employed in combination. Other oils may be mixed with the mineral oils.

[*Printed, 4d. No Drawings.*]

A.D. 1870, October 20.—No. 2761.

FORD, ALFRED.—Coloring india-rubber, gutta percha, and other like waterproof fabrics and materials.

This invention consists in the use of aqueous solutions of aniline colours in the dyeing or coloring of india-rubber, gutta percha, and other waterproof fabrics and materials.

[*Printed, 4d. No Drawings.*]

A.D. 1870, October 22.—No. 2790.

LAKE, WILLIAM ROBERT. — (*A communication from George Temple Chapman.*) — “Producing a hard, protective or “ornamental covering or coating of compounds of india-rubber or gutta percha upon metal and other surfaces.”

The india-rubber or gutta percha is dissolved in one of its solvents; one half pound of sulphur to one pound of india-rubber or gutta percha is then introduced into the solution, the sulphur being first reduced very fine by grinding in one of the solvents of india-rubber or gutta percha. “Allamine, “feldspar, silix, magnesia, sulphate or carbonate of lime, “French chalk, slate, lime, pumicestone, gum lac or gum “shellac, or soapstone may be added.” These substances must be ground very fine before mixing with the rubber or gutta percha. The compound is reduced to a homogeneous mass of the consistency of paint and is applied to the surface to be enamelled with a brush or by dipping or pouring. The article is then cured by exposing it to a high degree of artificial heat.”

[*Printed, 4d. No Drawings.*]

A.D. 1870, November 1.—No. 2879.

JOHNSON, JOHN HENRY.—(*A communication from Eliza Dexter Murfey.*)—Boxes and bearings for axles and other shafts, and compositions to be applied thereto.

Part of this invention relates to a slightly elastic bearing especially applicable to the axle boxes of railway vehicles. Upon a sheet of cloth, leather, paper, or other material coated with india-rubber is spread a bearing material or composition consisting of any suitable ingredients. The sheet is then passed between heated rolls which soften the india-rubber and work the powdered bearing material into the plastic india-rubber. The "sheet may be perforated throughout its entire extent with fine needles or punches, so that on the application of pressure the material will be forced into the perforations. After the sheet is pressed it may be cut into strips, pads, or washers for use as substitutes for the ordinary metallic bearings."

[Printed, 10d. Drawing.]

A.D. 1870, December 6.—No. 3200.

MACINTOSH, JOHN. — "Compounds for waterproofing textile fabrics and other surfaces."

One of the compounds consists of one part by measure of india-rubber paste and six parts of lampblack.

The patentee states that he is "aware that lampblack or carbon has been combined with india-rubber, but only in small quantities and merely as a coloring matter;" what he claims, in reference to this part of the invention, is "the combination of lampblack or carbon with india-rubber in large proportions so as to act as a preservative of the small proportion of india-rubber employed."

[Printed, 4d. No Drawings.]

A.D. 1870, December 13.—No. 3261.

COLEMAN, JOSEPH JAMES. — "Treating certain mineral lubricating oils and paraffin."

The object of the first part of this invention is to impart "body" to lubricating oils obtained from crude oil distilled from coal, or peat, or from petroleum, rock, or earth oils by

the processes of refining and treatment by acids and alkalis, which oils may be used alone or mixed with other oils. The result being the production of an oil similar in character to the oil prepared from the treatment of shale oil, as described in No. 1752, A.D. 1870.

Body is imparted to the oils mentioned by combining with them a certain portion of caoutchouc by the aid of heat, or by violently agitating the oils and the caoutchouc together, or both these methods may be employed in combination.

The second part of the invention has for its object the imparting to solid paraffin or paraffin wax the qualities of increased tenacity or toughness by combining with the paraffin a portion of caoutchouc. "The combination is effected by the aid of heat to reduce the solid paraffin to the liquid state, and mechanical agitation or heat alone may be used to effect the combination."

[Printed, 4d. No Drawings.]

1871.

A.D. 1871, January 14.—No. 104.

STEWART, LAURENCE. — (*Provisional protection only.*) — Wheels for carriages, waggons, carts, and other vehicles made of vulcanite.

This is a further development of No. 1095, A.D. 1870. The present invention consists in employing one or more strands of wire passing longitudinally through the spokes or arms of the wheel, being fastened at or near to the nave, and at the outer end of each spoke the strand is divided and each half of the strand is bent over to a circular arc corresponding to that of the felly of the wheel and in which the wire is enclosed when the caoutchouc either unmixed or admixed and combined with other materials is solidified or vulcanized over it.

[Printed, 4d. No Drawings.]

A.D. 1871, February 11.—No. 356.

QUIN, JAMES, and EASTHAM, ROBERT.—"Manufacture of india-rubber and other suitable elastic or flexible substances into hose or tubing."

At the top of a framing are attached a series of pinions, which gear into racks connected to or forming part of the hanging supports of a roller. Under this roller are arranged two other similar rollers which are mounted in slides and are capable of being moved further apart or nearer together. A mandrel is first coated with india-rubber by taking a piece of sheet rubber of the requisite length, and of a width rather more than equal to the circumference of the mandrel around which it is rolled and a lap joint is formed. This mandrel is then placed in the machine and a piece of woven cloth coated with india-rubber or other cement, and of a sufficient width to form the number of laps required is introduced into the machine with its forward edge in contact with the india-rubber coating of the mandrel. Upon the outer edge of the cloth is placed a piece of sheet rubber of a width rather more than equal to the outer circumference of the finished tube. The top roller being lowered till it presses on the material on the mandrel, a few turns of the rollers effects the required rolling and finishing, and a length of hose pipe is completed at one operation.

[*Printed, 10d. Drawing.*]

A.D. 1871, February 28.—No. 537.

WARREN, THOMAS THOMAS PETER BRUCE.—Treating india-rubber and other materials so as to render them suitable for insulating telegraph wires, and applying such insulating materials, and rendering india-rubber so treated suitable for remanufacture.

The object of the first part of the improvements is to obtain the electrical advantages of india-rubber, so as to insure its durability without vulcanizing, or the aid of sulphur, and also to dispense with india-rubber solvents.

The improvements also enable a cheap protective material, which is itself an insulator, to be applied over a thinly insulated wire. The patentee is aware that Letters Patent No. 11,147, A.D. 1846, have been granted to A. Parkes "for acting upon india-rubber with iodine, bromine, and chlorine, in the state of vapors, with the addition of vapors of india-rubber solvents, and for suspending articles of india-rubber in the same solvents, in which chloride of sulphur and other 'changing' agents have been dissolved."

The present improvements for rendering india-rubber suitable for insulating telegraph wires are carried out by submitting "the india-rubber insulated wires or telegraph cores, previously consolidated as herein-after described, to the action of iodine, bromine, or chlorine, dissolved in such menstrua as can neither dissolve india-rubber nor exert any action upon it, or by burying insulated wires in French chalk with which iodine or bromine has been previously triturated." The solvents it is preferred to employ are water, alcohol, wood naphtha, or mixtures of alcohol and water, to which iodide or bromide of potassium may be added so as to obtain a more saturated solution."

The conductors, whether iron or copper, may be coated with tin, and a mixture becoming adhesive by heat may be applied so as to ensure the adhesion of the india-rubber to the conductor under the process of consolidating.

The india-rubber coatings when applied spirally or longitudinally are consolidated by being coiled round iron cylinders, which are heated by air, steam, or water applied inside the cylinder, or the wire or coils may be placed in a heated chamber.

For making joints in insulated wires " (the ends of the conductor being united) the insulator is tapered down, and the surface pared off for a few inches on each side. The insulator is afterwards applied longitudinally or spirally, and when completed is tightly bound with tape." Heat is gradually applied. When cooled the tape is removed, and the joint is dipped into melted iodine; or bromine may be painted over it.

In remanufacturing india-rubber which has been treated with iodine or bromine it is submitted to a dry air heat of 280° Fah. for 4 or 6 hours so as to expel the iodine or bromine, it is afterwards mixed with a fresh quantity of india-rubber which is then suitable for ordinary india-rubber manufactures.

[*Printed, 10d. No Drawings.*]

A.D. 1871, March 10.—No. 640.

SUTHERLAND, MOSHER A.—An india-rubber compound adapted for use as steam packing, hose, belting, or other similar purposes.

Foliated or fibrous silicate or massive steatite, preferably asbestos, is compounded in suitable proportions with caoutchouc and sulphur, or other vulcanizing material, and vulcanized in the ordinary manner.

For making hose, belting, or similar articles canvas or other fabric is covered with the compound and vulcanized, and by coating a core of fibrous asbestos (not disintegrated) with this rubber-coated fabric another form of steam packing is produced.

[*Printed, 4d. No Drawings.*]

A.D. 1871, April 15.—No. 1010.

DAY, AUSTIN GOODYEAR.—An elastic compound resembling caoutchouc and designed chiefly for mixing with caoutchouc.

The compound is made by mixing the following substances in about the proportions mentioned:—14 pounds of cotton seed oil, 14 pounds of linseed oil, 8 pounds of asphaltum, 8 pounds of coal-tar, and 10 pounds of sulphur. It is preferred to add about one-half pound of camphor.

The tar or asphaltum and the cotton seed oil are first mixed in a suitable boiler under a sufficient heat, the linseed oil is then combined with them and the sulphur is added when the temperature of the compound is about 270° Fah. The sulphur is put in gradually and as it combines with the other substances the temperature is raised to about 310° or from that to 330° Fah.

[*Printed, 4d. No Drawings.*]

A.D. 1871, April 29.—No. 1151.

WALKER, JOSEPH.—(*Provisional protection only.*)—"A cloth " or material from which washing blankets used by calico " printers may be made."

India-rubber in the soft state, that is, previous to vulcanizing, is applied to a groundwork of cotton or linen cloth; the india-rubber surface is afterwards covered with powdered leather, which is partially imbedded in the india-rubber by the pressure of rollers.

[*Printed, 4d. No Drawings.*]

A.D. 1871, April 29.—No. 1155.

HARRIS, ISAAC BLUE.—Manufacture of india-rubber suction hose.

This invention relates to hose manufactured of india-rubber or india-rubber compounds in combination with canvas or cloth, and consists in a method of protecting the spiral metallic wire or loose rings employed in keeping the flexible materials of the hose distended. The outside covering of india-rubber and canvas, is first applied to the spiral wire or rings in the ordinary manner, a plastic india-rubber tube is then introduced inside the spiral wire; or rings, and hydraulic, or gaseous, or steam pressure is applied inside this plastic india-rubber tube. By this means the inner tube is forced outwards against the wire or rings and also against the inner surface of the outside covering. The hose is afterwards vulcanized.

[*Printed, 6d. Drawing.*]

A.D. 1871, May 6.—No. 1226.

MACINTOSH, JOHN, and BOGGETT, WILLIAM.—“Methods of expanding or treating sheet india-rubber, and employing it either by itself or combined with textile or other materials in the fabrication of various articles.”

One method of expanding india-rubber is to exhaust the air from a vessel over the mouth of which a sheet of rubber has been placed so that the pressure of the atmosphere shall dilate the rubber to the required degree.

Another method is “to lay upon a table a sheet of india-rubber and make it air tight at the edges, leaving an opening through which air or steam is forced until the sheet is sufficiently expanded. Two sheets laid one upon the other can in like manner be dilated at one operation, forming an inflated bag or tube.”

Or the sheet rubber “may be moderately heated and stretched out by any suitable mechanical means keeping it distending until cold, when it can be cured by the cold process or by the vapor of the curative solution.” Bags or tubes made as previously described are converted into elastic beds, cushions, and coverlets by laying them upon a frame divided by partitions. A similar frame is then laid on the

bag and the two frames are pressed together while the india-rubber is warm, or before the curative chemical has evaporated, which causes the adhesion of those parts where the partitions meet.

Elastic webbing or fabrics coated with india-rubber may be inflated and employed in making similar goods or articles.

Another method of constructing elastic air beds, cushions, and coverlets is to plait or interweave inflated india-rubber tubes made as previously described with tape or elastic bands.

In some cases the tubular webbing is placed between two strips of india-rubber and passed through warm rollers, the excess of india-rubber is then removed and the tube is turned inside out.

[*Printed, 4d. No Drawings.*]

A.D. 1871, May 8.—No. 1242.

ANDERSON, ALEXANDER.—(*Provisional protection only.*)—"Manufacture of india-rubber valves for steam engines."

This invention consists in strengthening the vulcanized india-rubber used in steam engines by incorporating with it, when it is being manufactured into sheets or slabs, wire gauze or netting in one or more sheets, or wire in any other convenient form.

[*Printed, 4d. No Drawings.*]

A.D. 1871, May 10.—No. 1257.

PAGET, FREDERICK ARTHUR.—(*Partly a communication from Louis Lemoine.*)—(*Provisional protection only.*)—"Improvements in springs."

This invention relates particularly to the annular or segmental springs used for the wheels of road locomotives and carriages, and to the annular springs used for buffer and draw springs. It consists in combining prepared cork with india-rubber, preferably vulcanized, and with or without additional springs of steel.

Cork in shreds, discs, segments, or other forms is prepared by soaking it in a solution of molasses and water, or in a concentrated solution of any deliquescent salt. It is then compressed and worked up into regular or irregular forms

with india-rubber heated in the usual way. "Or a sort of net
" of india-rubber may be formed into which the pieces of
" cork may be inserted."

[*Printed, 4d. No Drawings.*]

A.D. 1871, May 17.—No. 1333.

STEWART, LAURENCE. — (*Provisional protection only.*) —

"Wheels for carriages, waggons, carts, and other articles."

"Under the first system of construction the wheels are
" composed of a framework of wire constituting the core of
" the rim or felly, and to which the outer ends of the arms
" also formed of wire are attached, their inner ends being
" attached to the nave. This framework is covered with
" vulcanite in the plastic state and afterwards vulcanized."

Under a second system one or more strands of wire passing
longitudinally through the arms of the wheel may be used,
these strands being fastened at the nave of the wheel and at
the outer end of each arm, the strand proceeding from each
arm is divided, and each half is bent over to a circular arc
corresponding to that of the felly, and in which the wire is
enclosed when the caoutchouc, either mixed or unmixed with
other materials such as leather parings, is solidified or
vulcanized over it.

Under a third system the wire may be used in separate
lengths, and passed through the spokes or arms and felly
or other parts besides those at or near to the centre of such
parts.

"The spokes and felly of the wheel may be made hollow in
" place of solid, and instead of using a wire core, a core of
" malleable cast iron may be employed, or the central parts
" of the spokes and felly may be made of vulcanite and
" leather parings admixed, whilst the outer part is composed
" of vulcanite."

It is preferred to provide the wheel "with an elastic tyre
" between the wheel proper and the exterior metallic tyre."

[*Printed, 4d. No Drawings.*]

A.D. 1871, May 20.—No. 1364.

DAY, AUSTIN GOODYEAR. — "Protective and insulating covering
" for telegraphic conducting wires and compound for forming
" the same."

The compound is formed by the combination of caoutchouc and a small quantity of other substances herein-after specified with the artificial elastic compound described in No. 1,010, A.D. 1871. "These ingredients are combined in about the following proportions, viz., caoutchouc twenty pounds, the aforesaid elastic compound twenty to twenty-five pounds, and sulphur two and a half pounds." To these substances it is preferred to add three pounds of litharge or other oxide of lead or carbonate of lead. Gutta percha or a mixture of the same and caoutchouc may be used as a substitute for the caoutchouc to some extent.

"The compound when applied to the wire is vulcanized by subjecting it to a suitable heat."

The compound "may be employed as a substitute for india-rubber or gutta percha for many purposes."

[*Printed, 4d. No Drawings.*]

A.D. 1871, May 26.—No. 1413.

WALKER, JOSEPH.—(*Provisional protection only*).—"Material to be employed as floorcloth and for other purposes."

The material is made of india-rubber, one part; of naptha, two parts; of powdered leather, three parts. These form a dough, which is spread by means of rollers over the surface of cotton or linen cloth, "forming a felt thereon which may be faced or covered by cotton or linen cloth if desired; or cotton or linen cloth may be enclosed or coated on each surface by the dough."

[*Printed, 4d. No Drawings.*]

A.D. 1871, July 26.—No. 1958.

GALLOWAY, GEORGE BELL.—"Obtaining and applying motion power."

The "improvements consist in the application of various principle involved and in part described in" No. 55, A.D. 1865.

Part of the invention relates to the mode of making "elastic tires or rims to render travelling smooth." The patentee describes this part of the invention as follows:—"I dissolve by the action of steam or heated air or a chemical

"agent the parings of leather, and also spetches to be so dissolved, I then add a quantity of india-rubber or other combining adhesive substance to combine and temper such travelling rims or surfaces with sulphur or other hardening substance."

[*Printed, 6d. No Drawings.*]

A.D. 1871, August 2.—No. 2035.

STEWART, LAURENCE.—(*Provisional protection only.*)—"Pens for writing."

The pens are made of vulcanite or vulcanized caoutchouc or india-rubber combined or not with gutta percha, asphalte, or other similar ingredient.

The vulcanite or other material is reduced or rolled to the form of a sheet, and blanks of the requisite shape are cut, punched, or pressed out; these are afterwards curved to the shape of an ordinary writing pen and the points split by a splitting machine.

[*Printed, 4d. No Drawings.*]

A.D. 1871, August 5.—No. 2070.

PARNACOTT, EDWARD JOSEPH WILLIAM.—The manufacture of flexible elastic waterproof sheets, and the machinery employed therefor.

In the manufacture of the composition gutta percha is used, waste pieces of this material may be used, this is subjected to heat until brought to a soft state; ordinary pitch, Burgundy pitch, Stockholm tar, ballata, and consolidated oil. These substances are mixed in a pug mill or masticator, which is heated by steam. When properly amalgamated the compound is moulded to a suitable form.

When large sheets are required the compound is moulded into a cylindrical form having a mandrel through its centre or axis, this is mounted between centres in a lathe. The cutting tool is of similar construction to those used on wood planing machines, and it is carried on a table fitted on to a slide rest. On the sliding table in bearings is mounted a loose roller, which works against the face of the material during the cutting operation.

When small sheets are required the compound is moulded into forms suitable to the purposes for which it is required. " The bottom part of the form is moulded or dovetailed in a cast-iron plate. When the compound is sufficiently cold, it is taken from the mould and fixed securely by means of the plate to the table of a planing machine, which is similar in construction to an iron planing machine, except that the cutter is (or cutters are) much broader and of a similar construction to those used on wood planing machines, and fixed on a suitable carrier on the cross slide, having a vertical self-acting motion of the ordinary construction used for iron planing machines.

[*Printed, 1s. 4d. Drawings.*]

A.D. 1871, August 10.—No. 2106.

LAKE, WILLIAM ROBERT. — (*A communication from A. G. de Wolfe.*)—"Machine for covering wire with india-rubber or compounds of the same or similar substances, and for manufacturing tubes of such compounds or substances."

The machine has a cylinder for containing the substance or compound in a liquid condition. In this cylinder is a screw of the same diameter or nearly so as the bore of the cylinder. This screw extends through one end of the cylinder, and is supported in bearings, and is rotated by gearing outside of the cylinder. At one end of the cylinder is placed the die through which the substance or compound is forced to form the wire covering or the tubing, and through which the wire and the substance pass when the machine is employed for covering wire. "The said die is arranged at a right angle to the axis of the cylinder, so that the wire passes transversely across the end of the screw or at a right angle to its axis."

[*Printed, 8d. Drawing.*]

A.D. 1871, August 22.—No. 2207.

JOCHUMSEN, NIELS. — (*Provisional protection only.*) — "Material applicable to the manufacture of valves for pumps and other purposes."

The material is "composed of india-rubber and brass, copper, or other practically incorrodible wire cloth or gauze."

"The invention is carried into effect by placing sheets of the said wire cloth or gauze between layers of the india-rubber whilst the latter is in a plastic state, and which when subsequently vulcanized, rolled, or exposed to a pressure in the usual way becomes solidified through the meshes of the wire cloth."

[*Printed, 4d. No Drawings.*]

A.D. 1871, August 28.—No. 2256.

DAVIS, CHARLES, and STRUTHERS, THOMAS.—(*Provisional protection only.*)—"Composition for bootsoling, waterproofing, insulating, and other purposes."

The ingredients are cane or cocoa-nut fibre cut up fine and mixed with the bottoms of varnish and gutta percha about equal parts of each. The compound is then exposed to a moderate heat for from a quarter to half an hour while being stirred. A small quantity of stone ochre and if required pigments to color it are mixed in with the compound while being stirred.

[*Printed, 4d. No Drawings.*]

A.D. 1871, August 30.—No. 2282.

JOHNSON, HIRAM ANDRÉ. — (*A communication from Porter Smart.*)—(*Provisional protection only.*)—"Compound solution suitable as a vehicle to mix with pigments and coloring matters in the preparation of paint."

"First dissolve about three pounds of pure gum caoutchouc or india-rubber (by preference pure Para rubber gum) in about forty gallons of benzole of the gravity of seventy-one degrees Beaumé, then add thereto about eight ounces of sulphuric ether to facilitate the dissolution of the rubber, and stir the whole occasionally."

[*Printed, 4d. No Drawings.*]

A.D. 1871, September 16.—No. 2440.

CHAPMAN, GEORGE TEMPLE.—"Process for forming a hard protective or ornamental covering of india-rubber or gutta-percha upon the surface of metal, wood, clay, and other materials."

This invention consists in the hardening of india-rubber, gutta percha, and similar gums upon the surfaces of articles and substances, capable of withstanding the necessary degree of heat, by heat alone, dispensing with the use of sulphur or other vulcanizing agent. The raw gum is first reduced to the liquid state by melting or by dissolving with a solvent, it is then applied in any convenient way to whatever object it is desired to furnish with a hard surface, the coating is afterwards hardened by heat in a closed oven.

[*Printed, 4d. No Drawings.*]

A.D. 1871, October 24.—No. 2846.

HARRIS, ISAAC BLUE.—“Manufacture of piston packing
“formed of canvas, cloth, or other textile material in combination with india-rubber or india-rubber compounds
“susceptible of vulcanization.”

This invention consists in “submitting cords or ropes of
“india-rubber packing to vulcanization in a coiled state and
“thereby securing for the packing a permanent spiral or
“helical set.”

[*Printed, 6d. Drawing.*]

A.D. 1871, November 1.—No. 2927.

MOSELEY, CHARLES.—“Manufacture of bowls for calenders and other purposes.”

The bowls are made of vulcanized or other compound of india-rubber combined with vegetable or other fibre. This mixture is rolled into sheets, which are afterwards cut into discs and then vulcanized. The discs are placed upon a metallic centre and compressed by hydraulic pressure.
“These bowls can be made of any desired hardness or
“elasticity by an admixture of magnesia or other earthy
“substance or metallic oxides with the india-rubber.”

[*Printed, 4d. No Drawings.*]

A.D. 1871, November 20.—No. 3133.

BAKER, FRANCIS ROBERT.—(*Provisional protection only.*)—
“Manufacturing pens of ebonite.”

Ordinary ebonite is rolled into thin sheets, one side of each sheet is polished, the other side is left in the rough state in which it comes from the rolls. The sheet ebonite is next heated to a temperature of from 100° to 150° Fah., so as to soften it and remove the brittleness from it. While in the soft state blanks of the required shape are cut from it by means of press tools. The blanks are then pierced and slit. A series of these blanks are placed side by side and are clamped together and their edges are polished. "The blanks are next "warmed on a heated plate so as to make them flexible, and "while so heated are shaped or raised into pens by press "tools."

Instead of making the pens from sheet ebonite, they may be made by shaping or moulding ebonite while in a soft state, and afterwards hardening the pens in the way in which ebonite is usually hardened.

[Printed, 4d. No Drawings.]

A.D. 1871, December 13.—No. 3376.

GALE, WILLIAM JOSEPH, and BOYDEN, WILLIAM WESLEY.—*(Provisional protection only.)*—"Utilizing waste pieces of "leather for the production of new and improved materials."

The composition which is prepared in the manner herein-after described may be used in the manufacture of india-rubber, gutta percha, and parkesine, and for other purposes.

Leather cuttings and scraps are torn into shreds or ground into dust. A quantity of the shreds or dust is subjected to a solution of nitric, sulphuric, or other acid or acids heated sufficiently long to render the mass glutinous when it is washed first in alkaline water to expel the free acid and then in pure water. "In this state the composition is again subjected to heat, adding to it animal glue or size prepared in "a solution of nitric, sulphuric, or other acid or acids till it acquires the requisite consistency."

Coal tar is sometimes used instead of or in connection with the animal glue or size. "The material so far prepared is "then rolled into sheets of the required thickness and size "or subjected to pressure as found most convenient, and "subsequently dried."

Or the shreds or dust may be mixed with water, to which is added "a solution of animal glue or size prepared with

“ nitric, sulphuric, or other acid or acids, or with coal tar, or
“ with both as before described, the whole being subjected to
“ the action of heat, and when thoroughly amalgamated it is
“ washed in water and rolled or pressed into sheets.”

A weak alkaline solution is sometimes used instead of acids in the preparation of the pulp.

The invention further consists in vulcanizing the material prepared as above, whereby it is rendered applicable to the purposes to which vulcanized india-rubber is now applied.

[*Printed, 4d. No Drawings.*]

A.D. 1871, December 19.—No. 3437.

JAQUES, JAMES ARCHIBALD, and STERNE, LOUIS. —
“ Making bags and pouches of vulcanized india-rubber by
“ means of a moulding process.”

“ The rubber is prepared in sheets in the usual manner of
“ making vulcanized sheet rubber, and is cut up in pieces of
“ the required shape to form the sides and other parts of the
“ article.” “ The raw or cut edges of the several parts are
“ brought into contact and are pressed together by two
“ plates which form the outsides of the mould and which may
“ be engraved or cut with any device it may be desired to
“ produce on the external surface of the article. A metal or
“ other core is placed inside the bag, and when the mould is
“ closed and secured the article may be submitted to the
“ vulcanizing process in the usual manner.”

[*Printed, 8d. Drawing.*]

1872.

A.D. 1872, January 31.—No. 305.

JAQUES, JAMES ARCHIBALD, and BANKS, JOHN.—Manu-
facture of surgical instruments intended to be introduced into
cavities in the body.

The instruments are made of “ a compound of hard and
“ soft india-rubber, prepared by mixing metallic sulphurets
“ with the native rubber and then submitting the mixture to

"definite degrees of heat so as to produce the desired "chemical change in the mass." The instruments are made with a core of the hard compound to give the requisite rigidity, and the outer surface is formed of soft vulcanized rubber to impart the required softness and flexibility. These instruments are cured either in moulds or embedded in French chalk or other suitable material.

[Printed, 4d. No Drawings.]

A.D. 1872, March 15.—No. 793.

THOMAS, FREDERICK SAMSON.—Materials for "making roads, "ways, and floors."

This invention consists in melting india-rubber, gutta percha, or alpha gutta by means of and with pitch until they form one cohesive mass which is allowed to cool and is then pulverized.

This cohesive powder is mixed with a non-cohesive powder such as sawdust, coal ashes, pulverized granite, or by preference for roads "fossil ironstone" in a pulverized form. For the purpose of laying down either of the compounds thus formed it is heated and laid down while in a heated state.

[Printed, 4d. No Drawings.]

A.D. 1872, April 2.—No. 970.

DON, THOMAS, and WRIGHT, ROBERT ALFRED.—(*Provisional protection only.*)—Substitutes for leather, gutta percha, and other materials, and manufacturing articles from such substitutes.

Fibrous, ligneous, or textile substances or materials, or pulp or paper made therefrom are treated with one of the following agents,—"Cupro ammonium or a solution of copper in "ammonia, or sulphuric acid, or a caustic alkali." The material or pulp, after being deprived of the excess of the agent used, is moulded or shaped into the required form by pressure, forcing, rolling, or other method.

[Printed, 4d. No Drawings.]

A.D. 1872, April 30.—No. 1286.

MYERNS, HENRY.—(*Provisional protection only.*)—"Solution "for joining vulcanized india-rubber."

"Take (say) three parts of Stockholm pitch, three parts of American rosin, eight parts oil of turpentine, six parts best bottle india-rubber, and twelve parts best mineral naphtha, and dissolve them together by gentle heat, or one or more of the solids may be dissolved separately, after which add the requisite quantity of the oil of turpentine and mineral naphtha thereto."

[Printed, 4d. No Drawings.]

A.D. 1872, May 6.—No. 1874.

WISE, WILLIAM LLOYD.—(*A communication from Heinrich Huebscher.*)—(*Provisional protection only.*)—Musical instruments.

It is proposed to use "hard rubber," or "wood paste" soaked in glycerine" instead of wood for making the covers, cases, and various parts of musical instruments.

When "hard rubber" is used, "if the covers of harmoniums are to be made the soft india-rubber is thrust into the respective moulds and subjected to pressure, the ornaments or parts to be inserted, which may be composed of German silver, ivory, mother of pearl, or other material are then pressed into the soft plastic mass; the rubber is then hardened by the well-known mode of vulcanizing, and finally the surfaces of the covers containing the ornaments are ground and polished."

[Printed, 4d. No Drawings.]

A.D. 1872, May 8.—No. 1406.

WILBAUX, AMÉDÉE.—"Manufacture of printing surfaces for printing on paper hangings, stuffs, or other material."

Moulds of the designs to be reproduced are obtained "in any suitable material with plain surfaces, such designs being engraved or otherwise formed in such flat surfaces."

Upon the moulds is applied "a sheet, sufficiently thick according to the relief of the designs, of india-rubber, gutta percha, or mixtures of these two substances, or of glue, gelatine, vulcanized oils, artificial preparations or substitutes of india-rubber and gutta percha mixed or not, and lastly, of leather or of any other known substance capable of taking the impressions and of afterwards acquiring by

" themselves or by artificial means a degree of hardness rendering them capable of resisting the pressure and wear involved in printing." " The sheet of india-rubber applied upon the mould is first dipped into boiling water so as to render it plastic and therefore capable of being pressed into elasticity." These sheets of impressions are attached to rollers or blocks by india-rubber solution or other means, they are then submitted to a certain degree of heat to determine their shrinkage, and are afterwards vulcanized. " Some impressions may however be vulcanized and then applied to the blocks or rollers."

[*Printed, 4d. No Drawings.*]

A.D. 1872, May 27.—No. 1609.

HARRIS, ISAAC BLUE.—Moulds for the production of india-rubber disc valves and such like articles.

Heretofore these moulds have consisted of two concentric rings laid on a bed plate and covered by the other plate of the steam press, or between two plates clamped together if heated otherwise than by a steam press. The object of this invention is to provide means for readily securing these rings concentrically with each other. The bottom plate of the mould is provided with a centre stud which is notched to receive radial distancing bars, which serve to centre and retain in position the ring forming the inner wall of the mould. The ring forming the outer wall of the mould is secured in a position concentric with the inner ring by means of adjustable stops, which, when the ring is properly centred, are pushed into contact therewith and are then made fast to the bottom plate by clamping screws.

[*Printed, 8d. Drawing.*]

A.D. 1872, May 30.—No. 1637.

MOSELEY, CHARLES.—Condensing the vapours of coal tar naphtha generated in the manufacture of india-rubber.

The invention is applied to a spreading machine.

Upon the drying chest of the machine is fixed a cover or receiver of sufficient capacity for the passage of the cloth which is coated with india-rubber solution by the machine, and for the evaporation of the naphtha which is used as a

solvent for the india-rubber. Into the top or side of the receiver is inserted a tube or tubes of sufficient capacity to exhaust the vaporized solvent. The tube is connected to a fan or air pump, which draws away the naphtha vapour as it is generated and delivers it into a condenser, from which the air and naphtha vapour flow into a vessel. The condensed naphtha accumulates at the bottom of the vessel and the air escapes through a pipe.

[Printed, 8d. Drawings.]

A.D. 1872, June 13.—No. 1786.

ROLLS, JESSE GOULDSMITH.—Adapting and applying the gum or juice of the euphorbia tree to the purpose of an insulator of electricity in substitution for gutta percha and india-rubber, and also to the purposes for which vulcanites are applicable.

The gum or solidified juice is adapted for insulating purposes by pounding, grinding, or reducing, then drying by heat at a low temperature then dissolving by a suitable solvent, and finally hardening it by mixture with paints or by adding shellac or other dryers.

To adapt the gum or juice for use as a vulcanite it is dried and reduced, and afterwards heated and mixed with sulphur in the ordinary manner of forming a vulcanite.

[Printed, 4d. No Drawings.]

A.D. 1872, August 17.—No. 2459.

DODGE, GEORGE POMEROY.—(*Provisional protection only.*)—A cement, composed of india-rubber, oil, and other ingredients, for forming the joints of pipes or vessels for containing or conducting fluids.

A portion of waste or other more or less "cured" or vulcanized india-rubber is pulverized or ground between two rolls revolving at different speeds. With the ground india-rubber is mixed from one-fourth to three-fourths of the same quantity of tar oil; other oils will answer. The mixture is then submitted to a steam heat varying from 220° Fah. to a temperature corresponding with 60 lbs. or 70 lbs. steam pressure per square inch. When properly amalgamated the compound is taken out and mixed with suitable earths or metals. "Portland cement and fire clay are generally used, with sufficient sulphur to 'cure' it when applied to a hot joint."

The compound of india-rubber with oil, when mixed under steam heat and pressure, may be used to mix with or adulterate during manufacture the ordinary vulcanized india-rubber and gutta percha.

[*Printed, 4d. No Drawings.*]

A.D. 1872, August 28.—No. 2554.

MACINTOSH, JOHN, and BOGGETT, WILLIAM.—Manufacture of life preserves, air beds, cushions, and coverlets, and materials employed therefor.

"The object of this invention is to lessen the cost and weight of the above-named articles, by employing air-proof fabrics consisting of but one cloth in place of the double cloths heretofore used." The fabric the patentees prefer to employ is made "by giving a coating of india-rubber to closely woven thin cloth, adding upon it a second coat of a mixture of one part india-rubber and six parts of lamp black, or thereabout, mixed in naptha, in some cases putting in about 8 or 10 per cent. of paraffine, or for certain purposes where a high temperature is not objectionable, equal parts of india-rubber and paraffine." This or other air-proof single cloth is converted into life preservers, by making it into tubes. It is also used (generally converted into tubular lengths) for making air beds, cushions, and coverlets, by interweaving the tubes in the manner described in No. 1226, A.D. 1871. Or the above-mentioned articles may be made by fastening the opposite sides by placing discs of leather or vulcanized sheet india-rubber soaked in melted paraffine at intervals between the two cloths, through which holes are punched for the insertion of metal eyelets, which when pressed together, hold the cloth in its place. To prevent the passage of air the cloth is saturated round the apertures with spirit varnish. The compound of lamp black and india-rubber is not claimed as it is described in No. 3200, A.D. 1870.

[*Printed, 4d. No Drawings.*]

A.D. 1872, August 30.—No. 2582.

MUDFORD, GEORGE. — (*Provisional protection only.*) — "Manufacture of straps, driving bands, and belting for machinery."

A single strand is first formed by covering a wire with hemp, flax, wool or cotton, then two of such strands are twined into one cord, and cords so formed (in number proportioned to the width and thickness of the strap or band required) are arranged so as to constitute a warp, with which is interwoven a weft composed of the said fibrous material either alone or combined with wire, or of wire alone. The strap or belt so formed is afterwards coated with waterproofing, consisting of tar and resin, or oil and white lead, or other suitable composition, "and the strap or belt is or may be also covered with india-rubber and afterwards subjected to the process of vulcanizing."

[*Printed, 4d. No Drawings.*]

A.D. 1872, September 28.—No. 2867.

HARRIS, ISAAC BLUE.—"Material for use as packing for the piston rods of steam engines, and like uses."

The packing material is formed of india-rubber and sulphur mixed together with soapstone, or steatite, or French chalk in powder. The compound is made into a cord or strand around which a single or double layer of cloth is wound, the object of which is to keep the strand in form while it is subjected to partial vulcanization, and also to keep it from the piston rod when first applied, "until it shall have changed by the heat of the steam from the soft vulcanized condition to the more homogenous and consolidated plastic condition." "Instead of soapstone, or steatite, or French chalk, plumbago or black lead, or asbestos ground into a powder, or sulphate of barytes, or equivalent mineral powders may be employed in combination with rubber and sulphur."

[*Printed, 4d. No Drawings.*]

A.D. 1872, November 6.—No. 3292.

PARNACOTT, EDWARD JOSEPH WILLIAM.—Manufacture of artificial fuel.

One combination consists of,—"Clay 7 cwt.; road mud, 2 cwt.; smudge, fine riddlings of small coal or dust of coke, 8 cwt.; peat, 8 or 10 lbs.; sawdust, wood turnings, or shavings, 50 or 60 lbs.; chloride of sodium or common salt,

"about 6 lbs." After these have been properly agglomerated 2 lbs. of dissolved caoutchouc are added, preferably waste pieces, waste gutta percha may also be used. The whole is mixed in a pug mill afterwards pressed into forms in a brick machine, and then dried for use.

Another combination consists of,—Peat and sawdust which are placed in a pug mill and mixed together, a quantity of dissolved caoutchouc or gutta percha is added until the mass arrives at the proper consistency.

A superior fuel is made with peat or turf in combination with slack, small coal, or cinders, with the admixture of a quantity of clay and chloride of sodium and dissolved or powdered caoutchouc or gutta percha.

To improve the fuel after being dried, a quantity of liquid caoutchouc or gutta percha in the form of a spray is thrown over it. This liquid is also injected in the form of spray into boiler or other furnaces.

[Printed, 4d. No Drawings.]

A.D. 1872, November 15.—No. 3414.

CLARK, ALEXANDER MELVILLE. — (*A communication from Manuel Léopold Jonas Lavater.*)—(*Provisional protection only.*) — "Machinery for moulding india-rubber and other plastic materials."

The sheets of rubber from which combs are made are moulded with half round ribs on either side to form the round back of the comb, which is cut out of the sheet. A thin sheet of tin to serve as a mould is placed on each side of the sheet of soft rubber, which is then inserted between a pair of moulding cylinders, having grooves of the desired form made parallel to the axes of the cylinders, the grooves in the two cylinders meeting exactly at each revolution. The cylinders are made hollow and are heated. "By this means the plastic material is enabled to accurately take the form of the grooves, and the tin having the exact configuration of the cylinders serves as a mould, during the vulcanization."

[Printed, 6d. Drawing.]

A.D. 1872, December 27.—No. 3932.

QUIN, JAMES.—Manufacture of belting, made from woven fabric (cotton duck) and india-rubber.

The "duck" saturated with india-rubber is cut into strips of sufficient breadth when folded to make a belt of the required width, but is left the whole length of the piece of duck. This is folded by hand, covered with sheet rubber, and then passed through a metal die which is supplied with a suitable lubricant, and which smoothes and polishes the surface; and forms the edge square. As it issues from this die it is coiled on to a revolving cast-iron drum, a strip of thin metal (zinc by preference) being coiled up with it. It is then vulcanized while still on the drum.

[*Printed, 10d. Drawing.*]

A.D. 1872, December 27.—No. 3938.

QUIN, JAMES.—(*Provisional protection only.*)—Manufacture of solid seamless india-rubber tubing.

The india-rubber after mastication is placed into one end of a cylinder which is kept at a proper heat by a steam jacket. The other end of the cylinder is conical and terminates in a die, through which the india-rubber is forced by a piston.

If a wire lining is required the coil of wire is passed through a tube on which the piston rod (which is hollow) works.

"By working at a lower temperature and employing a suitable lubricant, gutta percha tubing may also be made by this machine."

[*Printed, 4d. No Drawings.*]

A.D. 1872, December 28.—No. 3944.

VENMAN, HEZEKIAH, and WARNE, CHARLES JOHN.—
"Manufacture of flexible type inking pads and rollers used for stamping and printing letters and devices."

A mould is formed of plaster, metal, paper pulp, or other suitable material of the required size and shape, with a loose or separate top and bottom. Into this mould is placed the die, and then the uncured mineralized caoutchouc. Pressure is exerted on the top of the mould and consequently on the india-rubber. Whilst under pressure the india-rubber is cured in the manner usually practised in the manufacture of mineralized india-rubber.

[*Printed, 4d. No Drawings.*]

1873.

A.D. 1873, February 17.—No. 587.

CATTELL, THOMAS.—Methods for purifying gutta percha.

Process No. 1.—Crude gutta percha is treated by the method described in No. 446, A.D. 1859, so far as to dissolve or bring the same into the state of a solution, which is then filtered or strained and subjected to one of the following processes A., B., C.:—

A. The vapor of alcohol either in its methylated or pure state, pyroxylic acid, or amylic alcohol is passed through or into the solution. This step of the process will be accelerated by passing dry steam with the alcohol into the vessel containing the solution. This operation is continued until the purified gutta percha is deposited or separated.

B. The vapour of alcohol is to be added to the solution in a heated condition, in quantity sufficient to effect the deposition or separation of the gutta percha. When, however, any one of the alcohols is added at its ordinary temperature, heat is to be applied until the deposition or separation is effected.

C. The solution is passed into a vessel in a spray-like form, and currents of steam are simultaneously directed into the vessel so as to come into contact with the sprayed solution. The steam, with the vaporized solvent passes out of the vessel into a condenser and the gutta percha is deposited.

Process No. 2.—The gutta percha in a shaved or shredded condition is placed in a vessel containing water in sufficient quantity to allow the gutta percha to be kneaded along with the solvent. The contents of the vessel are gradually heated until the gutta percha is softened, so that it may be easily strained, and this operation may be repeated until the gutta percha is sufficiently freed from impurities. Should any portion of the solvent employed be present with the gutta percha it may be removed by submitting the gutta percha to a current of steam.

Process No. 3.—The gutta percha in a shaved or shredded condition is placed in a vessel and submitted to a mixture of benzole or other rectified products of coal tar, naphtha, and methylated or other alcohols, or petroleum spirit, and

methylated or other alcohols, or bisulphide of carbon, and methylated or other alcohols, in equal or nearly equal proportions. The contents of the vessel are to be gradually heated, and the gutta percha is to be kneaded until it becomes so softened as to be capable of being readily forced through strainers. It is then submitted to the action of steam.

Process No. 4.—Instead of adopting any of the steps described in the prior Specification to get rid of the solvent, the heat required for the manufacture of the solution is withdrawn and the solid mass is broken up into small particles which are dropped into an apparatus into which currents of steam are conveyed. The steam and vapor may be condensed and the purified gutta percha will be left in the apparatus. The same result will be obtained by passing the vapor of alcohol into the apparatus.

[*Printed, 4d. No Drawings.*]

A.D. 1873, March 13.—No. 916.

MOSELEY, CHARLES. — “Apparatus for condensing the vapours of naptha.”

This is an improvement on No. 1637, A.D. 1872. Referring to the prior invention, the patentee states, “it is found that a great proportion of the vapours of naptha instead of being condensed escape into the atmosphere with the air, and the object and effect of my present invention, is to prevent the escape of the naptha vapours.” This is accomplished by causing the naptha vapours and air escaping from the condenser to pass through wire gauze sieves or perforated plates and through a body of naptha.

[*Printed, 8d. Drawing.*]

A.D. 1873, March 19.—No. 1015.

HACKING, WILLIAM HENRY, and HACKING, THOMAS.—Machinery for plaiting or folding and measuring woven fabrics.

Part of this invention relates to the material for holding the cloth when plaited and the means used for attaching the same to the machine. For holding the cloth when plaited the patentees employ a strip of thin vulcanized india-rubber moulded on coarse sacking cloth or other suitable mould to

give it a rough surface. The rubber is backed with strong canvass and attached to the ordinary holding rail of the machine.

[*Printed, 8d. Drawing.*]

A.D. 1873, March 26.—No. 1119.

WOODCOCK, FREDERICK ALONZO. — "The preparation of "india-rubber."

From india-rubber in its cleaned state is prepared dough or paste of any desired consistence, dispensing with the processes of drying, masticating, and crushing, and also with the finishing dough machine commonly used. The sheets of cleaned india-rubber are allowed to absorb any suitable solvent, sulphur, metallic oxides, sulphurets of metals, or other substances may be added.

The saturated india-rubber or compounds of india-rubber are placed in a machine called a "digester," by which the preparation of the dough is completed. "The digester may "be described as a closed cylinder, access to the interior "being by a moveable lid or cover. A piston is provided "pierced by numerous passages, such passages resembling a "double cone or other figure through which, on the piston "traversing the cylinder, the saturated contents are squeezed. "The motion of the piston will be slow at the first, increasing "towards the completion of the operation."

It is preferred to connect the piston rod with a hydraulic ram and to work the machine by hydraulic pressure.

[*Printed, 4d. No Drawings.*]

A.D. 1873, March 28.—No. 1166.

HARROP, JAMES.—Apparatus for the manufacture of india-rubber hose, and other tubular articles.

This "invention relates to a method of coiling india-rubber "or several 'plies' upon each other, and subsequently "submitting them to a rolling action."

A table is provided with a projecting guard or fence, against which is placed the core of the intended article, and beneath this core one edge of the "ply" to be coiled is placed. "Above the core are two rollers capable of being turned

" upward or downward upon a longitudinal shaft driven by the motive power, and carrying gearing which gives motion to screws connected to the bearings of the aforesaid rollers, which are also caused to revolve by suitable gearing. The core and ply having been adapted as above mentioned, the two rollers are turned down so as to be brought in contact with the former, the guard or fence giving way against springs, and the machine being then put in motion, the two rollers by their rotation coil the ply upon the core, and at the same time move outward bodily to effect the necessary number of coils. This outward movement may extend to any distance after the whole of the ply has been coiled to effect a rolling action, after which the motion of the machine is reversed and a rolling inward takes place."

[*Printed, 10d. Drawing.*]

A.D. 1873, April 16.—No. 1383.

HARRIS, ISAAC BLUE.—"Preparing wire cloth coated with india-rubber for the manufacture of washers, piston packing, hose, and such like articles."

This invention consists in cutting a sheet or web of wire cloth coated with india-rubber into diagonal strips of any suitable width before the rubber is vulcanized, and with these strips forming washers, valves, cords or ropes for packing, hose and tubing, and such like articles in the same manner as when textile cloth is used to form these articles.

[*Printed, 8d. Drawing.*]

A.D. 1873, May 12.—No. 1715.

JAMIESON, ALEXANDER.—(*Provisional protection only.*)—"Regulating the temperature of vulcanizing apparatus for vulcanizing india-rubber used in the manufacture of artificial teeth."

The quantity of gas admitted through the tube which supplies the burner under the vulcanizing chamber is regulated by the expansion and contraction of mercury placed in a glass tube or chamber let into the top of the vulcanizing chamber. "When the heat of the steam in the vulcanizing chamber has reached the proper temperature, the mercury

“ in the gas chamber expands, and closes or partly closes
“ the gas tube (which is made to extend down in the mercury
“ chamber) to cut off or regulate the supply of gas to
“ the furnace, for keeping the vulcanizer at the proper
“ temperature.”

[*Printed, 4d. No Drawings.*]

A.D. 1873, May 14.—No. 1756.

RHODES, SAMUEL GIBSON, and MILLER, JOSEPH.—(*Provisional protection only.*)—Manufacture of tobacco pipes and cigar holders.

Caoutchouc, sulphur, and any suitable colouring matter such as French chalk or vermilion are reduced by heat to a soft state and then pressed into a mould of the desired form with a core for forming the inside of the bowl and stem.
“ The mould being filled with the compound it is brought to
“ a temperature of about 300 to 350 degrees Fahrenheit.
“ When brought to a proper degree of softness the mould is
“ closed and retained in position by a clamp.” Afterwards the forms are placed in a vulcanizer, which consists of a metallic vessel heated by gas or other means; “ in this
“ vessel the forms are exposed to a temperature of about 300
“ to 350 degrees Fahrenheit, the vessel at the same time is
“ kept closed and charged with superheated steam at a
“ high pressure. This operation hardens or vulcanizes the
“ caoutchouc. After this operation the form is taken from
“ the mould, cleaned, and dressed.”

[*Printed, 4d. No Drawings.*]

A.D. 1873, July 9.—No. 2375.

TORREY, SAMUEL WHITTEMORE.—(*Provisional protection only.*)
—“ Preparing textile fabrics, india-rubber, gutta percha, and
“ other like materials to preserve them from decay.”

Cloth or other textile material is saturated with carbolic acid, coal tar, naphtha, or other similar antiseptic by immersion or by pressure of steam in a closed vessel. The india-rubber or gutta percha is treated in the same manner, and may be combined with the textile fabric by passing them together between rollers.

[*Printed, 4d. No Drawings.*]

A.D. 1873, August 29.—No. 2844.

MACINTOSH, JOHN. — Compounds for waterproof fabrics, also applicable to other purposes.

This invention consists in mixing large quantities of carbon in the form of lampblack, soot, or ground charcoal, or their compounds with india-rubber or its compounds in the proportion of about 4 parts by weight of carbon to one part of india-rubber. The mixture is effected by means of heated masticators or mincing rollers and without the india-rubber paste or solvent described in No. 3200, A.D. 1870.

[*Printed, 4d. No Drawings.*]

A.D. 1873, September 16.—No. 3043.

TURNER, ARCHIBALD. — (*A communication from Charles Righter.*)—Manufacture of india-rubber hose and tubing, and the preservation of india-rubber, gutta percha, and rubber fabrics.

This invention consists in treating flexible hose or tubing or the fabrics or materials of which it is made with carbolic acid or its equivalent. Also in treating india-rubber and gutta percha with carbolic acid or its equivalent either during their manufacture or after vulcanization for the purpose of preserving them.

[*Printed, 4d. No Drawings.*]

A.D. 1873, October 17.—No. 3362.

UNSWORTH, JAMES. — (*Provisional protection only.*) — Manufacturing frillings.

This invention consists in the introduction of elastic india-rubber threads into fabrics for the purpose of producing a frilling.

It is proposed to prepare the elastic rubber threads with steatite, which enables the elastic rubber to work in friction with the silk warp.

[*Printed, 4d. No Drawings.*]

A.D. 1873, October 22.—No. 3425.

DODGE, GEORGE POMEROY.—(*Provisional protection only.*)—
“Manufacture of india-rubber hose.”

The inventor covers canvas or other suitable fabric on one or both sides with a coat of india-rubber unvulcanized; he then cuts up this material to the desired width and size for the intended hose, and he stitches it into shape, and immediately or at the same time nearly covers the stitches on the line of stitches inside or inside and outside the hose with a strip of india-rubber, or fabric covered with india-rubber, using solvent or solvent india-rubber when necessary to secure adhesion. The pipe is then placed on a mandril, by preference French chalk, or other material being previously applied to the interior of the pipe. The whole is then vulcanized in the usual manner.

[*Printed, 4d. No Drawings.*]

A.D. 1873, November 19.—No. 3753.

TOUSSAINT, CHARLES ISIDORE.—Manufacture of composite straps or driving bands and other articles, and machinery to be employed in connection therewith.

The first part of the invention relates to composite straps and other articles in which india-rubber, gutta percha, or other resinous and plastic substances are employed. In the case of a strap of six thicknesses a strip of nonvulcanized india-rubber or other suitable substance is enclosed in a seamless cover of textile material, having warp and woof, in the form of a flattened tube, thus obtaining two thicknesses of strap. This strap is then coated with india-rubber, and a second covering of seamless cloth placed around it, thus producing four thicknesses, a similar operation being performed to produce the last two thicknesses. A final coating of india-rubber may be added or not. The strap is then finished by being pressed and vulcanized.

If the strap is to have an odd number of thicknesses the first or odd fold or layer of textile fabric is placed in the centre as a core, and having been coated on both sides with india-rubber it is then covered with successive layers of seamless tissue until the desired thickness is obtained.

When the two outer folds of the strap are worn out they may be removed, and the strap used without them, or a fresh coating of india-rubber may be applied to the inner folds, and a new seamless wrapping substituted for the same.

The invention further relates to a loom for weaving the seamless tissue.

[*Printed 8d. Drawing.*]

A.D. 1873, November 27.—No. 3885.

HARRIS, ISAAC BLUE.—Manufacture of hose or flexible tubing for conveying oils, beer, spirits, and alkaline and acid liquids, and capable of resisting internal and external pressure.

The inner surface of the tube is made of any of the mixtures of rubber and sulphur that will harden under the curing process "into vulcanite or ebonite, or by preference into a soft "vulcanite or a semi-hard flexible horny substance," this is coated with soft rubber compound, and this again while still in the green state is enclosed in coils of cloth, the tubing is completed by a coating of soft rubber compound, the whole is then submitted to heat.

To adapt the tubing for the transmission of water and steam at a high pressure and to enable it to resist rough usage it is proposed to embed within the hose a coil or coils of wire, which may either form a substitute for the coils of cloth or may be employed together with the same.

[*Printed, 6d. Drawing.*]

A.D. 1873, November 27.—No. 3886.

HARRIS, ISAAC BLUE.—"Manufacture of tubing, suitable "for distributing gas and other fluids, or as conduits for oils, "beer, spirits, and alkaline and acid liquids."

It is proposed to manufacture india-rubber tubing the internal surface of which shall possess a horny character. For this purpose a compound of sulphur and india-rubber is prepared in the proportions commonly employed in the production of what is known as semi-vulcanite, and this material, when converted into tubing, is submitted to the curing process. The tubing is made thin to ensure its flexibility and it may be strengthened either with an external or an internal coil of wire.

The semi-vulcanite may also be used as an internal facing for a soft rubber tube.

[*Printed, 8d. Drawing.*]

1874.

A.D. 1874, January 6.—No. 63.

QUIN, JAMES.—(*Provisional protection only.*) — “Protecting “ india-rubber valves, tubes, and other like articles from “ chemical action.”

For valves an elastic cloth is provided, which is saturated or faced with a metallic or vegetable substance such as lead, tin, tinfoil, tea lead, or varnish. The valves and like articles are encased by the cloth, they may also be coated with the substance without the cloth. When so prepared they are placed in moulds and subjected to the usual heat for vulcanizing.

For tubes an inside casing of the same material is applied, but for some purposes a thin casing of metallic foil is provided, this is impregnated with the inner surface of the tube previous to vulcanizing. In all cases when vulcanized they are inseparable.

[*Printed, 4d. No Drawings.*]

A.D. 1874, January 9.—No. 124.

TRUMAN, EDWIN THOMAS. — Manufacture of insulated telegraphic conductors, machinery for their manufacture, and the preparation of the materials therefor, parts of the machinery applicable to other purposes.

The first part of this invention relates to apparatus for covering wire or other conductors with gutta percha or other insulating material.

Another part of the invention consists in the formation by moulding of a solid covering applied to those portions of the wire which form the union or joint between the various lengths in which the covered wire is made. It is preferred to unite the ends of the wire in the manner sailors splice a rope, the joint is then covered with gutta percha or other insulating material by placing the uncovered joined wire and the two ends of the disconnected covering in a mould, which should be slightly heated. The mould is in halves united by a hinge, and there is an opening communicating with a filling machine,

which forces a continuous supply of heated gutta percha into the mould.

Another part of the invention relates to what is termed "the filling machine," which is similar in its general construction to the machines described in No. 878, A.D. 1870, the improvement consisting in constructing machinery for giving out a regular and uniform supply of gutta percha or other insulating material with two screws, the first delivers the material from a hopper to the second screw, which delivers it to a tube or die.

Another part of the invention relates to machines for washing or cleansing gutta percha and other analogous materials described in No. 41, A.D. 1870. The improvement consists in the use in the machines of openings so provided with means of closing them that they can be closed or partly closed as required.

[Printed, 6d. No Drawings.]

A.D. 1874, January 28.—No. 354.

GILBEE, WILLIAM ARMAND.—(*A communication from Emil Boëthius.*)—Cork cutting machinery, partly applicable to other purposes.

The first three parts of these improvements may be employed for such purposes as cutting paper, pasteboard, and india-rubber.

The improvements relate,—Firstly, to a machine for cutting the corkwood or bark into strips. This machine is constructed of two pairs of horizontal feed rollers which carry the sheet cork to be cut into strips towards a revolving circular knife, having a ground edge which is kept sharp by a pair of revolving rollers having leather bands on their peripheries.

Secondly, to a machine for paring or barking the strips of cork made from thick cork wood. Two horizontal rollers are employed, the shafts of which move in adjustable bearings. Above the first of the said horizontal rollers is another roller having its bearings in a moveable frame turning on centres in a line with a horizontal shaft driven by a strap from the main shaft; a circular rotary knife is employed, the shaft of which moves in bearings in a frame on one of the side standards of the machine. The knife is kept sharpened by two

whetting rollers attached to a directing bar running in guides at the sides of the said moveable frame. The moveable frame, the shaft, and the whetting rollers attached to the director are so connected together that when the moveable frame is raised or lowered, the knife and the whetting rollers are moved to the right or to the left in proportion as the upper roller is raised or lowered according to the thickness of cork required.

Thirdly, to a machine for cutting the strips of cork into pieces suitable to be made into corks. A guide is employed fixed to a diagonal piece placed like the guide at an angle of forty-five degrees to the machine. A continuous forward and backward motion is communicated to the guide by means of an eccentric. The table receiving the strips of cork is screwed to the said guide and consists of a horizontal plate having a fillet or raised piece at one side with a returned end. An arm is screwed at one end of the table which follows the direction of the said fillet. A plate screwed to the framework inclines over the table and has a fillet similar to that of the table. In each fillet there is a slit to allow of the passage of the knife. A moveable frame pivots at one side on fixed bearings carrying a shaft driven by a strap. At the other end of the frame is a shaft provided with a circular knife. The frame also carries the shafts of the whetting rollers and is connected by means of a rod to a balance lever jointed to the framework of the machine, and resting on an eccentric keyed on the main shaft so as to communicate an intermittent up-and-down motion to the knife. The breadth of the piece of cork cut by the knife is determined by the width of the strip.

[Printed, 7s. 6d. Drawings.]

A.D. 1874, April 8.—No. 1223.

HASELTINE, GEORGE. — (*A communication from Henry Franklin Read.*)—(*Complete specification but no Letters Patent.*) — Water meters of the class in which a screw propeller is employed for transmitting the measurement of the water to the indicating dial.

The propeller is made of hard india-rubber, and part of the invention consists in a method of moulding it in a metallic mould, which is composed of spiral segments with straight ends having screw threads cut upon their outer faces, and

the interior hollow of the mould formed by these segments is of uniform size and open at each end. The straight ends of the segments are secured together by annular collars to which each segment is fastened by a screw. Spiral slots are formed between the segments and within these slots the vanes of the screw propeller are formed. Caps carrying plungers are screwed upon the threaded ends of the segments when the mould is filled with rubber. The caps are cylinders of a depth to allow them to be screwed over each end of the shell of the mould and to meet in the middle of its length so as to form a case for the spiral openings of the mould. The plungers, being carried within the mould by the screwing on of the caps, serve as pistons to compress the rubber within the mould from both ends alike and out into the spiral openings and in this way form the hub and the projecting vanes at one operation.

Instead of the sectional mould a solid mould may be employed, the moulding chamber being formed in a solid core with spirally-formed grooves in the solid metal of a depth just equal to the projection of the vanes. "In using the solid mold a piece of rubber is rolled into the form of a hollow cylinder and inserted into the chamber, and the ends of the rubber cylinder are sealed with rubber discs after a small quantity of water has been put into the said cylinder and metallic caps are applied to each end. The mold is then subjected to heat which generates steam within the closed chamber of the rubber core, and the force thereof drives the rubber out into all the spiral grooves, forming thereby the vanes with a hollow hub. It is then cooled and screwed out of the mold."

[*Printed, 10d. Drawing.*]

A.D. 1874, May 9.—No. 1650.

FRANKENBURG, ISIDOR.—"Waterproofing and preparing leather."

The leather is coated "with a solution of india-rubber in naphtha combined with chloride, sulphur, and bi-sulphide of carbon or other chemical agents." The leather is then exposed to the atmosphere and to artificial heat in an oven until the naphtha is evaporated.

[*Printed, 4d. No Drawings.*]

A.D. 1874, May 20.—No. 1794.

BAKER, JOHN MORCOMBE BROMLEY. — Material for the manufacture of horse-shoes applicable also for other purposes.

This invention consists in combining metal borings or turnings with gutta percha or other suitable plastic materials. The gutta percha is first melted and then the borings or turnings are mixed with it, the composition is then run into moulds of the desired shape and size and if necessary it is subjected to pressure whilst warm.

[Printed, 4d. No Drawings.]

A.D. 1874, June 17 —No. 2106.

CONYBEARE, HENRY, and NAPHEGYI, GABOR.—(*Provisional protection only.*)—Treating the juice of the zapote or chickley tree and producing materials and articles therefrom.

The product of the tree is termed "zapotine" and it may be used as a substitute for caoutchouc, gutta percha, and their compounds, and for other materials.

To render zapotine applicable as a substitute for gutta percha it is dissolved in alcohol or ether, and the alcohol is distilled off.

For adapting the zapotine to the purposes of india-rubber two processes are described:—According to one process the zapotine is passed through or exposed to carbonic acid in a state of gas or otherwise or it is passed through or exposed to compounds containing carbon.

According to another process 2lbs. of caoutchouc are combined with 3 lbs. of zapotine. This compound is converted into a material analogous to vulcanized india-rubber by processes similar to those by which india-rubber is converted.

To convert zapotine into a substance similar to vulcanite or hard rubber it is combined with white lead and sulphur.

[Printed, 4d. No Drawings.]

A.D. 1874, June 24.—No. 2199.

ROBERTS, GEORGE HENRY.—"Apparatus to be employed in "the manufacture of screws of vulcanite or other analogous "material."

A mould is employed formed of a number of cores, or spiral segments of metal to form the threads of the screw, each core being in the form of the space between two adjacent threads and having a projecting rim running along one side. These cores are arranged inside a cylindrical mould box so as to form a complete mould of the screw required; they fit against each other, and are received at their lower ends on a piece of metal shaped to fit. The top and bottom of the cylinder are formed in separate pieces. When the parts are all put together, with the exception of the top, the rubber or composition to form the screw is placed in the mould in bulk sufficient to stand somewhat above the mould, the top is then placed on the rubber and forced down so as to force the rubber into the spaces between the cores. The mould with the screw therein is then submitted to heat to cure the screw.

The cores are formed of tin or other readily fusible metal capable of withstanding the heat required to cure the screws, and they are cast in moulds of the form required.

[Printed, 6d. Drawing.]

A.D. 1874, June 29.—No. 2250.

LAKE, WILLIAM ROBERT.—(*A communication from William Bell*).—(*Provisional protection only*).—"Compounds for surfacing textile and other fabrics, which compounds are also designed for use as a substitute for wood and other material in the production of moulded articles."

The compounds are intended to be used in place of india-rubber, leather, gutta percha, paper, and oiled or painted cloths.

The compounds are composed as follows:—Glue dissolved with vinegar or other suitable liquid ten quarts, glycerine from two and a half to four quarts, cork in fine particles from five to seven quarts, and about an ounce of chromic acid, or an equivalent quantity of bichromate of potassa; the chromic acid being first dissolved in water and then mixed with about one quart of glycerine before being added to the other ingredients. It is preferred to add to the compound either tannic acid or Aleppo gall water. In case Aleppo gall water is added, then one quart of good oil (linseed preferred) is to be mixed with it.

After the article has been formed or coated and is sufficiently dry it is preferred to apply to the surface of the compound employed the following solution—about one ounce of chromic acid (or its equivalent) is first dissolved in a small quantity of water and then added to about a quart of glycerine. This process is termed vulcanizing.

[Printed, 4d. No Drawings.]

A.D. 1874, July 8.—No. 2402.

LAKE, WILLIAM ROBERT.—(*A communication from L. Otto P. Meyer.*)—"Compound to form surfaces for the ignition of " safety matches."

The compound consists " of india-rubber or allied gum, " sulphur, and gray sulphuret of antimony, the said com- " pound being vulcanized by heat as in the preparation of " what is known as hard rubber or vulcanite.

[Printed, 4d. No Drawings.]

A.D. 1874, August 6.—No. 2727.

PIERI, JACQUES PHILIPPE.—Manufacture of cartridges with cases formed of metal foil and caoutchouc or gutta percha.

The case is composed of a piece of foil rolled up into the form of a tube and with an envelope of caoutchouc or gutta percha or their compounds. It is preferred to use Para caoutchouc mixed with chalk or whiting and gravel. The mass is passed between parallel rollers to reduce it to a very thin sheet, which is spread upon a slab and coated with sandarach gum, talc, or other powdered material; the sheet is then cut into pieces of the required size. Each piece is rolled up with a piece of foil upon a mandril and then introduced into a mould and subjected to vulcanization; or the mould may be dispensed with by binding the cartridge with paper or cloth, which is removed after the vulcanization. The cartridge when withdrawn from the mould is dipped in cold water and then in oil.

[Printed, 4d. No Drawings.]

A.D. 1874, August 10.—No. 2762.

INGRAM, JAMES GEORGE.—Manufacture of india-rubber washers or packing pieces.

Around a mandril of any desired size are wrapped layers of india-rubber and canvas in any desired alternation until the required thickness is produced, thus producing a tube in the cross section of which the layers of india-rubber and canvas alternate. This tube is then cut up crosswise into slices so as to produce washers or packing pieces of any desired thickness.

[*Printed, 4d. No Drawings.*]

A.D. 1874, August 26.—No. 2913.

THOMSON, GAVIN, and WATSON, GEORGE.—Manufacture of compound india-rubber sheets or surfaces applicable to various purposes.

One side of the sheet is composed of "india-rubber, sulphur, lime, or other materials, which admit of being converted by heat into ebonite, or hard rubber, or vulcanized only," the other side of the sheet being simply of india-rubber, or compounds of india-rubber or other materials which will not become hard when subjected to heat. The materials are prepared in separate sheets, one with and the other without sulphur, and then united by rollers or otherwise, and subjected to heat together.

[*Printed, 4d. No Drawings.*]

A.D. 1874, September 5.—No. 3048.

TALLING, RICHARD, and SECCOMBE, JAMES.—"Manufacture of material suitable for packing for steam engines, junction rings or washers, paint varnish, lacquer, coverings for floors, also for roofing and other purposes."

The invention consists in the employment of mica or of minerals of the mica species either separately or in combination with some binding or retaining material, such as vulcanite, caoutchouc, or other gum resin, and in some cases also with hemp, jute, or cotton, or like fibrous substances or with asphalt or other analogous substance for the purposes above mentioned.

A packing is made by combining from ten to eighty per cent. of ground mica with caoutchouc.

For stuffing boxes one pound of india-rubber is incorporated with four pounds of ground mica, to which one ounce of

sulphur is added, the compound is cured in the usual manner.

[*Printed, 4d. No Drawings.*]

A.D. 1874, October 7.—No. 3433.

HARRIS, ISAAC BLUE.—Manufacture of india-rubber mats.

The mats are made with a series of closely set conical or other shaped projections rising from a sheet of rubber forming the ground work of the mat, and made in a piece with it.

The mat is made in a mould consisting of a plate through which a series of conical holes are made. These holes form cells for the plastic india-rubber compound, and they are made completely through the metal to ensure the expulsion of the air. The mould plate is set in a cast iron chase and is placed upon a press plate a layer of cloth being interposed between the press plate and the mould. A sheet of plastic india-rubber is then inserted in the mould and over this a piece of cloth to receive the pressure of the follower plate of the press which forces the plastic material into the conical cells of the mould. The mould is afterwards clamped between plates and submitted to steam heat to vulcanize the mat.

[*Printed, 6d. Drawing.*]

A.D. 1874, October 7.—No. 3437.

INGRAM, JAMES GEORGE.—“Manufacture of bands or straps, “and of washers, sheets, rings, discs, tubes, and packing, “and insertion pieces.”

This invention consists in the employment in the manufacture of various articles of india-rubber of a layer or layers of perforated sheet metal or wire gauze in combination with layers of india-rubber, and with or without layers of canvas or cloth.

In the case of bands or straps where great strength is required, whether made of india-rubber, gutta percha, or other material, continuous longitudinal rods, bars, or flat strips of hoop iron or other metal are embedded in the interior of the bands or straps.

[*Printed, 4d. No Drawings.*]

A.D. 1874, October 24.—No. 3672.

GREENACRE, THOMAS. — “Apparatus for manufacturing screws of vulcanite or other analogous material for liquid meters.”

It is proposed to dispense with moulds in the manufacture of these screws, and in lieu thereof to cut them out of solid material. For this purpose a metal screw, of the pitch required for the vulcanite screw, is mounted in two fixed standards. This metal screw is capable of revolving freely in bearings except as controlled in its rotation by the means hereinafter described. “At one end of the metal screw is formed or fixed a socket to receive one end of the piece of solid vulcanite or a spindle carrying the same, the other end of which may be passed into another socket formed to revolve freely in an adjustable standard or ‘poppet head,’ or it may be carried by a centre bearing. Over the metal screw is passed a nut, to which is fixed by rigid connections properly guided a cylindrical cutter head, which may be provided with three sets of cutters mounted therein, in which case each set would be of a corresponding number to the threads required in the screw, and would be fixed a short distance in front of the other and so that the second and third sets should each cut a little deeper than the cutters immediately in advance of them, the last set of cutters being arranged to finish the desired screw, or in some cases more sets of cutters or only one cutter may be employed, or they may be caused to traverse more than once over the vulcanite.

“The nut is by suitable means moved slowly forward so as to cause the cutters to traverse the length of the piece of solid vulcanite to be cut into screws.” In some cases lengths of solid vulcanite suitable for making two screws at the same operation are employed.

[*Printed, 10d. Drawing.*]

A.D. 1874, November 12.—No. 3902.

QUIN, JAMES.—“Protecting india-rubber valves, tubes, and other like articles from chemical action.”

The patentee describes his invention in the following terms:—

“ For valves and such-like articles as may be required to be made insoluble I provide as required by the shape and size an inside shape or groundwork so much less than the object I desire to make. This I make of ‘red’ or A ‘floating rubber,’ which possess the quality of both lightness and durability. These I coat or case with a mixture of mineral and vegetable matter for enveloping the valves with or without ground metallic dust or foil in such proportions as the nature and future use of the article may require.”

“ For pipes, tubes, and such-like articles I provide similar groundwork of red or floating A, cased with and by a similar material and in a similar manner, after which they are vulcanized in the usual way.”

[*Printed, 6d. Drawing.*]

A.D. 1874, November 28.—No. 4079.

YOUNGHUSBAND, GEORGE, YOUNGHUSBAND, GEORGE THOMAS, ROCKLIFFE, WILLIAM, and ROCKLIFFE, JAMES WILLIAM.—(*Provisional protection only.*)—“ Composition suitable for preserving the bottoms of ships, boats, and other similar vessels.”

One pound of gutta percha, half an ounce of copper bronze and half an ounce of arsenic are mixed and melted together; the mixture is allowed to cool and it is then cut into sheets.

The bottom of the vessel is cleaned and heated and a coat of liquid gutta percha is applied, and allowed to cool. The surface of this first coating is warmed and the sheets of composition are laid on it whilst still warm.

[*Printed, 4d. No Drawings.*]

A.D. 1874, December 16.—No. 4343.

LAKE, WILLIAM ROBERT.—(*A communication from William Bell.*)—Compounds to be used as substitutes for india-rubber, gutta percha, and other materials.

The compounds consist of glue 10 quarts; glycerine from $2\frac{1}{2}$ to 4 quarts; cork, when used from 5 to 7 quarts, but this may be omitted; and about an ounce of chromic acid or an equivalent quantity of bichromate of potassa, the chromic acid

being first dissolved in water and then mixed with about 1 quart of glycerine before being added to the other ingredients. It is preferred to add to the compound to be used either tannic acid or Aleppo gall water, one quart of the former, or two quarts of the latter. In case Aleppo gall water is added then one quart of good oil (linseed preferred) is to be first mixed therewith.

After the article has been formed or coated and is sufficiently dry, it is preferred to apply to the surface of the compound used the following solution, about one ounce of chromic acid (or its equivalent) is first dissolved in a small quantity of water and then added to about a quart of glycerine. This process is termed vulcanizing.

[*Printed, 4d. No Drawings.*]

1875.

A.D. 1875, January 1.—No. 9.

FISH, WILLIAM STEBBINS.—“Material applicable for packing
“ stuffing boxes of engines, pumps, and other mechanism,
“ for packing joints of pipes, boilers, tanks, cylinders, and
“ valve chests, and others analogous thereto, also applicable
“ for covering floors, roofs, and other surfaces.”

The material is formed of a mixture of raw caoutchouc or india-rubber gum and triturated or comminuted asbestos or amianthus. The caoutchouc is kneaded in a masticator and when sufficiently reduced to a pasty condition the asbestos or amianthus is mixed with it, and these are still further operated on by the masticator until the asbestos or amianthus is regularly distributed throughout the pasty caoutchouc. A sufficient quantity of sulphur is also mixed with the compound for the purpose of vulcanization.

[*Printed, 4d. No Drawings.*]

A.D. 1875, February 20.—No. 633.

NAPIER, WILLIAM DONALD. — India-rubber compound for making tooth, and flesh brushes or rubbers.

It is proposed to combine with the india-rubber a sharp polishing powder, such as powdered pumice. "The powder is worked into the india-rubber compound by means of kneading rollers, and when the mixture is complete the brush moulds are filled with it, and the india-rubber is then cured by the application of heat."

[Printed, 4d. No Drawings.]

A.D. 1875, April 17.—No. 1404.

HENDERSON, WILLIAM CREAM. — (*Provisional protection only.*)—Treatment of "vulcanite," to obtain various colored effects.

India-rubber is combined with color and sulphur is added in such quantity as may be required for the conversion of the india-rubber; the compound is then "cured" or partially "cured" so as to reduce it into particles of the size required. These particles are mixed with the dough of ordinary vulcanite in proportions varying with the effect desired to be produced. This dough is then formed into sheets or moulded, and "cured." Effects are obtained resembling granite and other stones, or marbles.

[Printed, 4d. No Drawings.]

A.D. 1875, April 22.—No. 1477.

TONGUE, JOHN GARRETT.—(*A communication from Raymond Edouard Montaugé, and Auguste Alfred Brandely.*)—"Manufacture of corks or stoppers from cork, reduced to powder and mixed with india-rubber and other materials."

The cork is reduced to dust, the gum and other impurities in the cork being removed by boiling alcohol, and by washing in water. The cork dust is then drained and dried, and from 10 to 20 per cent. of hemp put the length of about a $\frac{1}{4}$ to $\frac{1}{2}$ inch is added, or the hemp may be omitted. The india-rubber is dissolved in refined sulphuret of carbon and brought into a state of paste, which is put into a mixing apparatus and the cork dust is added thereto. When the materials are well mixed the compound is placed in the apparatus employed to mould it into corks or stoppers.

For certain kinds of stoppers the right is reserved to impart greater rigidity to the composition or paste by making

mixtures of wood sawdust or any powders or dust taken from either vegetable, animal or mineral substances.

[*Printed, 1s. 2d. Drawings.*]

A.D. 1875, April 27.—No. 1549.

YOUNG, JOHN. — Manufacture of waterproof and airproof fabrics.

This invention relates to the vulcanizing of india-rubber or compounds of india-rubber used for cementing together two textures of animal fibres. The invention also applies where textures of cotton or mixed fibres are used in producing the compound fabric.

The fabrics to be joined are coated on one side with a solution of india-rubber, and the rubber covered sides of the fabrics are run over a roller mounted in a vessel charged with a solution composed of bi-sulphide of carbon and chloride of sulphur or any other liquid vulcanizing agent, and immediately brought together by passing the coated fabrics between a pair of nipping rollers while the two surfaces are tacky. By this means a vulcanized double texture fabric is obtained without employing heat.

[*Printed, 8d. Drawing.*]

A.D. 1875, June 4.—No. 2059.

GREENING, FREDERICK. — Compounds to be used as substitutes for india-rubber, for insulating telegraph wires, for the production of waterproof fabrics, and for other purposes.

This invention consists "in submitting mixtures of paraffin, shellac, resin, or gum, such for example as copal, also of the residues left after effecting the distillation of the heavier oils of tar or mixtures of the same with solution of gun cotton, or with soluble compounds analogous thereto, to the action of kreosote obtained from wood tar or of mixtures of the same with other solvents of gun cotton, which at an elevated temperature effects the combination or incorporation of the materials."

[*Printed, 4d. No Drawings.*]

A.D. 1875, June 5.—No. 2074.

NEWTON, ALFRED VINCENT.—(*A communication from Leonard F. Requa.*) — “Compound for coating textile fabrics and “ rendering them acid and waterproof.”

“Crude gum or rubber” is washed in water, and then dried and reduced by the masticating process and by rolling to a comparatively thin or sheet condition. Six pounds of the prepared india-rubber are submerged in two gallons of benzine or other suitable solvent, which will in about ten hours reduce the same to a plastic state. To this are added “ fifteen pounds of ground whiting or chalk, five pounds of “ oxide of zinc, two pounds of asphaltum, seven ounces “ of pulverized sulphur, and two pounds of lampblack. “ These ingredients are then subjected to agitation in a “ closed vessel till thoroughly mixed and brought to a proper “ consistency to be spread upon the fabric.” “The coated “ material is submitted to a steam heat in a closed chamber “ under a pressure of about thirty pounds to the inch to “ vulcanize or cure the same.”

[*Printed, 4d. No Drawings.*]

A.D. 1875, June 5.—No. 2075.

NEWTON, ALFRED VINCENT.—(*A communication from Leonard F. Requa.*) — Manufacture of waterproof bags, cases, and envelopes from textile fabrics and paper coated with india-rubber compounds, the object being to secure the lapped edges of the articles by the coated surface; also deodorizing the same.

The material having been prepared, cut, and folded to the required size the uncoated surface of the lapped portions joins the coated surface, and to secure the connection of the parts of the lapped portions are rolled with a cold roller. Bags thus prepared are then put into a suitable box one upon the other and vulcanized by steam.

In order to deodorize the bags, leaf mint is placed among and between the bags in the curing chamber, so that the heat from the moist steam seizes upon the mint leaves, and impregnating them produces an evaporation from the leaves which permeates the bags. This effect is enhanced by the employment in connection with the mint leaves of copperas.

[*Printed, 6d. Drawing.*]

A.D. 1875, July 9.—No. 2482.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication from Francis Scholes, and Peter Couper.*)—(*Provisional protection only.*)—"Machine for the manufacture of rubber belting."

"At one end of a long table is mounted a frame holding two or more horizontal bars," upon each of which is placed a pair of adjustable discs. A smaller frame, similarly arranged, but with one bar less in it, is placed immediately in front of the frame just mentioned and in rear of a pair of rolls, the lower of which is carried in proper bearings and driven by suitable means. The upper roll is placed between grooved uprights. Beyond these rolls are placed long adjustable guides, which serve to fold the cover piece over those in the centre. Next to these come one or more pairs of rolls, having small guides provided to each; another pair of rolls, also provided with guides, is placed near the end of the table.

"The several pieces which are to make up the belt pass over the horizontal bars in the end frame and between the discs, which are arranged so as to bring them exactly one over the other and centrally with the cover piece, which passes over the bottom bar and straight to the first pair of rolls, the filling pieces being taken through the second frame so as to keep them separate from each other till they reach the rolls, which press them with the centre part of the cover piece firmly together. The belt thus half formed passes on to the folders, which by their peculiarly curved inner surfaces turn over and inwards the extra width of the cover piece, till on issuing from the folders the belt is formed, and is thoroughly pressed together between the pair or pairs of rolls beyond the folders.

"Between the centre and last pairs of rolls is arranged a reel carrying the rubber strip which is to be placed upon the joined edges of the cover piece; this is conducted from the reel to an adjustable guide through which it passes to the last pair of rolls, means being provided for damping the strip with benzine." The belt passes in a receptacle filled with French chalk, and is afterwards vulcanized.

[*Printed, 4d. No Drawings.*]

A.D. 1875, July 12.—No. 2495.

HEINZERLING, CHRISTIAN, and LIEPMANN, HENRY.—Recovering and utilizing refuse caoutchouc and gutta percha.

The refuse caoutchouc or gutta percha is first disintegrated by any convenient means, it is then subjected to a treatment first with acids and then with alkalies, it is next washed with water and dried. The material is next subjected to a treatment with either turpentine, naphthaline, sulphide of carbon, petroleum, or petroleum spirit.

A solution of caoutchouc or gutta percha is thereby obtained, which solution may be distilled or concentrated and employed in the preparation of cements or in the manufacture of water-proof articles.

When the solution is employed in the preparation of inflexible caoutchouc or vulcanite, the residuum after concentration may either be mixed with new caoutchouc and then vulcanized, or it may be directly used by admixing it with resins.

[*Printed, 4d. No Drawings.*]

A.D. 1875, July 15.—No. 2547.

CATLOW, URBAN, and HOYLE, ROBERT.—Stoppers for bottles, and purifying and protecting the same and other articles.

Part of this invention relates to eliminating the smell from india-rubber by washing it in a boiling solution of caustic alkali, preferably a strong solution of Canadian black ash, and then in one of ordinary washing soda.

[*Printed, 6d. Drawing.*]

A.D. 1875, September 7.—No. 3138.

THOMSON, BENJAMIN LUMSDEN, and CONNOLLY, THOMAS.—“Protecting ships or vessels and other submerged or partially submerged surfaces.”

To the sides of the vessel or other surfaces are applied suitably prepared sheets of copper, zinc, yellow metal, or other similar metals or alloys, with the interposition between such sheets and the sides of the vessel or other surfaces of a layer or layers of insulating adhesive compounds. “This

" compound consists of caoutchouc combined with any sulphide of antimony or other suitable poisonous compound " so as to secure at the same time both poisonous and vulcanizing properties." To this may be added a variable quantity of silica or French chalk. Over this layer of compound is applied a second layer of sheets consisting of caoutchouc combined with litharge, oxide of zinc, silica, and other suitable substances to act as strongly adhesive protective and insulating material. Heat is applied to the sheets of metal by which the inner layer of compound will become vulcanized.

[*Printed, 4d. No Drawings.*]

A.D. 1875, October 15.—No. 3578.

MACLELLAN, GEORGE.—Compound of caoutchouc with other substances.

The object of the invention is to produce a material heavier and less brittle than ordinary vulcanite.

It may be carried into effect in two ways, first, by disintegrating the waste of india-rubber cloth manufacture, or old india-rubber cloth, the result of which is the production of a mass of india-rubber with the fibres of textile material mixed with it. With this, if there is not sufficient sulphur, the requisite quantity of sulphur and colouring matter are added and the whole mass is next placed in moulds and submitted to the ordinary vulcanizing process, except that it is submitted to that process for a longer period than is usual in the manufacture of ordinary vulcanite. Or a quantity of rags or textile fibres may be commingled with raw india-rubber, together with colouring matter and sulphur after which the mass is vulcanized.

[*Printed, 4d. No Drawings.*]

A.D. 1875, October 22.—No. 3675.

BARROW, JOHN.—Condensing the vapours evolved during the process of applying india-rubber to fabrics in spreading machines.

A chamber, termed "the evaporating chamber," is formed by placing a loose cover over the steam chest of the spreading machine. With the evaporating chamber are connected other

chambers, into which the vapour is caused to flow. Within these chambers the vapour is caused to come in contact with and to be absorbed by an oil or oleaginous absorbent boiling at a higher temperature than that at which the naphtha to be absorbed will boil, which oil when saturated with condensed naphtha is subjected to heat sufficient, without distilling the oil, to distil from it the naphtha, which is condensed and collected, so that it and the oil may be used over again.

This method of dealing with the vapours of wood naphtha and turpentine.

[*Printed, 1s. Drawing.*]

A.D. 1875, November 5.—No. 3862.

JENKS, THOMAS.—(*Provisional protection only.*)—Composition termed “caoutchouc aluta” used for jewellery, buttons, &c., and as a substitute for vulcanite.

Leather is cut up and boiled in water for five hours, then a sufficient quantity of oxalic acid is added to dissolve the leather, and a portion of glue. In another vessel are placed resin, pitch, and Japan wax or beeswax, in suitable proportions, and a portion of copal gum previously dissolved in oil is added. Caoutchouc is dissolved in another vessel with boiled linseed oil under heat. The three solutions are mixed together and a powder formed of plaster of Paris and colored pigments is stirred into the composition to thicken and stiffen it.

[*Printed, 4d. No Drawings.*]

A.D. 1875, November 10.—No. 3904.

MORI, FREDRICK.—“Thermo-regulators.”

Part of this invention consists “in arranging thermo-
“ electric piles inside the case of a vulcanizer for dental
“ purposes to generate the electric current by heat instead of
“ using a battery to work the thermo-regulator.”

[*Printed, 1s. 2d. Drawings.*]

A.D. 1875, December 17.—No. 4372.

DUNBAR, HIRAM POND, and LOTHROP, THOMAS CHURCH.—
“Manufacture of articles from vulcanized rubber.”

This invention relates to the manufacture of floorcloths and other articles and it consists of a product composed of a foundation of a cheap compound of india-rubber overlaid or inlaid with a series of strips, figures, or characters of a thin and more expensive india-rubber compound, which is capable of receiving any desired color or tint, these strips or figures being in the final stage of the vulcanizing process imbedded in the foundation so that a uniformly even surface exists over the whole.

[*Printed, 6d. Drawing.*]

1876.

A.D. 1876, February 11.—No. 563.

MAGNUS, GUSTAV. — “Manufacture of billiard balls and “ similar objects.”

The object of this invention is to produce a material as a substitute for ivory. It is stated that “the trials heretofore “ made by others with india-rubber have failed chiefly “ because they could not vulcanize to a diameter of from “ about two to three and a half inches without causing the “ core to crack and the ball becoming porous.” Rubber expands considerable in the vulcanizing so that moulds of tin are bulged and even burst, the patentee therefore makes the moulds of cast iron. The inner half spheres of the mould are tinned. The two parts being held together by discs and tie bolts. About ten hours is taken for vulcanizing and a gradually increasing heat is employed. In order to make the balls of the same specific gravity as ivory about 50 per cent. of heavy spar (Schwerspath) is added to the rubber.

[*Printed, 6d. Drawing.*]

A.D. 1876, February 24.—No. 776.

NEWTON, HENRY EDWARD.—(*A communication from Alfred Joseph Macbay.*)—Converting vegetable and animal fibres and fibrous substances of various kinds into substances resembling wood, vulcanite, rubber, gutta percha, or other hard or tough

substance, so that the artificial substance produced may be used as a substitute for any of the natural substances.

In carrying out the invention the fibrous substances are consolidated by pressure in moulds or otherwise, and by preference with the addition of resins of various kinds, pitch, tar, gums, size, glue, shellac, rubber, gutter percha, turpentine, petroleum, or any other hydrocarbons or oils and their products, paraffine, wax, tallow, and like substances and their products, farina, starch, or gluten, and the glutinous matter of seeds, grain, pulse, and tubers and their products, lime, chalk, sand, clays, earths, plaster of Paris, Portland and other cements.

[*Printed, 4d. No Drawings.*]

A.D. 1876, April 8.—No. 1502.

MOSELEY, CHARLES. — “Apparatus employed in various processes where inflammable oils are used.”

This invention is particularly applicable to the condensing apparatus described in No. 1637, A.D. 1872, and No. 916, A.D. 1873, but it may be applied to other apparatus for collecting the vapours of naphtha or other solvent used in the manufacture of india-rubber, and to other processes in which inflammable oils are employed. The object of the invention is to confine within certain limits the flames of such vapours or oils when they become ignited by accident. It consists in placing screens of wire gauze or perforated sheet metal in the flues, passages, pipes, or vessels, through which the inflammable vapours or oils circulate, or in which they are contained; these screens do not prevent the passage of the vapours or oils, but in case of fire they intercept the passing of the flames.

[*Printed, 4d. Drawing.*]

A.D. 1876, April 22.—No. 1704.

FIXSEN, BURCHARD. — (*A communication from Ludwig, Danckwerth.*) — “Manufacture of india-rubber and gutta percha compounds.”

The compounds are formed by the combination of ozocerite or ozokerite (also known as fossil resin or fossil wax or earth

wax) with india-rubber, or with gutta percha, or with a mixture of india-rubber and gutta percha, or with other materials, which when combined with the ozocerite in suitable proportions will form a substance that may be used in place of ordinary natural or vulcanized india-rubber or gutta percha.

[Printed, 4d. No Drawings.]

A.D. 1876, May 24.—No. 2186.

WOODWARD, HENRY. — (*A communication from William Henry Lippincott.*)—"Manufacture of balls for billiards or "other similar purposes."

A variety of moulds with suitable vulcanizing apparatus are employed. A central core is first vulcanized, which core is then turned spherical, and afterwards enclosed in another mould of larger size containing rubber sufficient to surround the core and fill the mould, which with its contents is subjected to the same vulcanizing process as the first. This layer is then turned true as before, and in this manner any number of layers may be added until the ball attains the required size.

Any desired color may be obtained by mixing suitable coloring matters with the last layer of india-rubber.

For red and white the following ingredients are found to answer the purpose:—

Red	- Para india-rubber	- 8 parts by weight.
	Vermilion	- 6 parts by weight.
White	- Para india-rubber	- 8 parts by weight.
	Zinc white	- 5 parts by weight.
	Calcined magnesia	- 1 part by weight.

[Printed, 4d. No Drawings.]

A.D. 1876, June 3.—No. 2339.

NEWTON, WILLIAM EDWARD.—(*A communication from Walter P. Jenney.*)—The treatment of sludge oil produced in the purification of crude petroleum, asphalt, bitumen, and other substances from which hydrocarbon oils are obtained, and obtaining useful products.

Part of this invention consists in oxidizing sludge oil and producing a resinous substance therefrom.

"It has also been discovered that the resinous substances derived from sludge oil by other processes may be combined with raw or vulcanized india-rubber in all proportions from one part of resin to twenty parts of rubber to one part of rubber in twenty parts of resin, thereby producing a new and useful compound. The compound is made by heating in an iron, steel, or other suitable vessel the resin derived from sludge oil until it is completely melted, and then adding the rubber to it in small pieces, the heat being kept sufficiently high to melt both rubber and resin, and thoroughly to incorporate them."

The compound may be used as a cement, or for waterproofing, or for making a varnish, or for other purposes.

[Printed, 4d. No Drawings.]

A.D. 1876, June 16.—No. 2500.

LAKE, WILLIAM ROBERT.—(*A communication from Charles Grasser.*)—"The production of moulds in wax, plaster of Paris, and other similar materials and patterns, and other articles of india-rubber or other gum capable of vulcanization."

"For forming and vulcanizing a pattern or other article of soft rubber within a metal mould the raw material is applied to the interior of the mould, first in small fragments so as to fill all the interstices, and then in larger pieces or sheets an opening being left to admit to the interior water in which the whole is immersed, and which receives a heavy pressure to force the rubber against the inner surface of the mould. Heat is then applied by steam in a surrounding chamber and through the medium of the water and the metal mould to the rubber." The mould is enveloped in an impervious cover connected with the hollow body within the mould so that the water will pass into the hollow body to be formed but cannot pass between it and the mould.

"For producing articles in hard vulcanite by the agency of steam, heat, and pressure, the mould is formed of a thin body of plaster within a perforated flask or outer mould of metal, approximating to the shape of the pattern, so that the entire mould may have sufficient strength to resist the

“ pressure, and the plaster of which its inner surface is
“ formed may not be of sufficient thickness to prevent the
“ conduction of the necessary heat for vulcanizing.

“ The raw rubber is applied in sheets over an envelope of
“ soft vulcanized rubber on a hollow core either porous or
“ perforated, which approximates to the shape of the article
“ to be formed, the envelope preventing the rupture of the
“ raw rubber by the internal steam pressure. The vul-
“ canizing heat is produced through the medium of steam
“ applied by means of separate chambers to the exterior of
“ the mould and to the interior of the material within it, the
“ pressure on the interior of the material being in excess of
“ that on the exterior of the mould, so as to cause the
“ material to be forced in close contact with the inner surface
“ of the mould.”

The vulcanizing vessel is formed “ with an inner chamber
“ in which the mould is placed (or any number of them) and
“ an outer chamber with which the hollow interior of the
“ mould communicates through a hollow screw-plug by
“ which the mould is attached to the vulcanizer and by
“ suitable ducts.

“ In using soft elastic rubber patterns for forming moulds
“ of wax, paraffine, or like substance, the said patterns are
“ coated with glycerine and a solution of sal ammoniac or
“ other suitable salt to prevent adhesion of the wax to the
“ rubber.”

[*Printed, 10d. Drawings.*]

A.D. 1876, June 27.—No. 2652.

LÉVY, DAVID.—Straps or belts for driving machinery.

This invention consists in the combination of one or more layers of fibrous fabrics united by means of gutta percha.

The layers of fabric start from reels, pass between guide rollers and are kept apart at this stage by retaining rollers, after which they join together on their arrival at a draw plate, the object of which is to distribute the gutta percha, which is brought between the layers of fabric by “long-necked flues” placed between the retaining rollers and the draw plate. After passing the draw plate the layers of material pass between two rollers which compress them and

cut off any excess of gutta percha from the edges. Occasionally it is found desirable to pass the belting through a second pair of rollers.

[*Printed, 6d. Drawing.*]

A.D. 1876, July 13.—No. 2866.

DEISS, AUGUSTUS, and SCAIFE, REGINALD. — “Treating
“ india-rubber, gutta percha, amber, resin, and other vegetable gums, and also ceraffine, ozokerite, bitumen, asphalt, sulphur, and other mineral and animal products in order
“ to free them from impurities and render them more
“ valuable.”

This invention consists in treating the materials mentioned above by means of solvents, such as bisulphate of carbon, hydrocarbons, essential and other oils, with the assistance of steam or other heat, and a great pressure; also in a filtration and a final regeneration of the solvent used. A strong cast or wrought iron vessel is used. It has a manhole for loading it with the material to be treated and an exit pipe near the bottom to let the solution of the material under treatment run out into a filtering apparatus. This vessel is provided with a steam jacket or other heating appliance for assisting the solvent to act on the material. The solvent is inserted by a force pump or other means into the vessel until the solution is thin enough to pass through a filtering apparatus. The vessel is also supplied with a stirring apparatus.

The next operation is to run off the solution into the filtering apparatus, which consists of a closed iron vessel with a perforated bottom containing the filtering material, such as sawdust, charcoal, bran, moss, or any like substance. The clarified solution is run into an evaporating pan where the gum is freed from the solvent, which passes as vapour into a condenser so as to be collected and re-used.

[*Printed 4d. No Drawings.*]

A.D. 1876, August 31.—No. 3428.

STEWART, DUNCAN.—Making and repairing balls for golf and other games, “which balls are made of gutta percha.”

“The invention consists in dissolving the pure gutta percha
“ with bisulphate of carbon or other solvent into a soft or

“ plastic state, and then mixing the same with fine ground
“ cork and metal filings in the proportions suitable for
“ giving the size, elasticity, and weight of ball desired.”
Sometimes it is found advantageous to add to the mixture a
small quantity of fibrous substance in order to give increased
cohesion to the mass.

[*Printed, 4d. No Drawings.*]

A.D. 1876, October 10.—No. 3921.

FORSTER, THOMAS.—“ Manufacture of double texture water-
“ proof fabrics.”

The patentee says,—“ It has been the usual practice hitherto
“ in using the chloride of sulphur combined with bisulphide
“ of carbon as a vulcanizing agent to apply the same only to
“ the rubber surfaces of waterproof goods, on account of the
“ corrosive action of the chloride on the texture.

“ According to my invention I apply the above compounds
“ direct to the cloth surfaces of double-texture waterproof
“ fabrics, be they woollen, silk, or cotton fabrics, and after
“ so doing subject the said fabrics to the action of an alkali,
“ by preference ammonia, which by neutralizing the hydro-
“ chloric acid (resulting from the decomposition of the
“ chloride of sulphur) prevents its injurious action.”

[*Printed, 2d. No Drawings.*]

A.D. 1876, October 25.—No. 4132.

HEALD, JOHN. — “ Machine for grinding and doughing
“ india-rubbers and their compounds for spreading purposes,
“ likewise suitable for paints and other materials.”

Three or more grinding rollers are carried in bearings in a
suitable frame, the centre or main roller is placed near the
middle of the lower part of the frame, and underneath is a
receiver. This main roller is made hollow so that steam may
be passed through it or hot water for heating purposes or cold
for cooling purposes. Above the main roller are two or more
smaller rollers driven from the main roller at such speeds
that a grinding surface is formed between such rollers and
the main roller, all of which lead from front to back of the
machine in their grinding action. These rollers are regu-

lated by set screws to or from the main roller. Near the centre of the main roller is fixed a plate or bar in the edge of which is a groove, into which is fitted a piece of elastic material which presses against the main roller and forms the bottom of the hopper on that side of the machine. On the other side of the main roller is a bevelled edge plate which forms a scraping edge to take off the material which passes along with the rollers, this plate forms the bottom of the hopper on the other side of the machine. An agitating roller working in the hopper keeps the material from settling or clogging.

[*Printed, 6d. Drawing.*]

A.D. 1876, December 5.—No. 4705.

NEWTON, HENRY EDWARD.—(*A communication from Henri Menier.*)—"Manufacture of telegraphic and other conductors covered with caoutchouc or other insulating substance."

"The object of the present invention is to cause the caoutchouc or other insulating substance employed for covering wires to quickly harden." "To this end the newly covered wire before vulcanization is conducted through a vessel or chamber containing a freezing or refrigerating mixture." "On issuing from the other end of the freezing or cooling chamber the covered wire can be immediately coiled up in a suitable vessel or tank, to facilitate which operation the receiving tank is kept rotating on its vertical axis by means of suitable gearing."

[*Printed, 6d. Drawing.*]

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Rhodes and Miller, 77.
Truman, 81.
Haseltine (*Reed*), 83.
Roberts, 86.
Harris, 89.
Magnus, 100.
Woodward (*Lippincott*), 102.
Lake (*Grassor*), 108.

Powdering and re-vulcanizing india-rubber:

Moulton, 16.

Preparing gutta percha (treating the raw material):

Cleansing:
Sintzenich (*Reed*), 9.
Truman, 39.
Cattell, 73.
Truman, 81.
Deiss and Scaife, 106.

Masticating:
Truman, 45.
Straining and Filtering:
Deiss and Scaife, 106.

Preparing india-rubber (treating the raw material):

Cleansing:
Sintzenich (*Reed*), 9.
Truman, 39.
Deiss and Scaife, 106.

Digesting:
Woodcock, 75.
Dissolving and reducing:
Macartney, 45.

Preparing india-rubber, &c.
—*cont.*

Grinding and doughing;
Heald, 106.

Heating before masticating or dissolving;
Hooper, 14.

Straining and filtering;
Deiss and Scaife, 106.

Preserving india-rubber, gutta percha, &c., from decay:

Torrey, 77.
Turner (*Lighter*), 78.

Sheet india-rubber or gutta percha:

Coating with flock;
Macintosh and Boggett, 6.

Coating with pumice stone;
Macintosh and Boggett, 6.

Expanding and treating;
Macintosh and Boggett, 55.

Making:
Mayall, 20.
Mayall, 21.
Forster and Cow, 32.
Wilkinson and Boss, 35.
Smith and Challenger, 36.
Walker, 39.
Walker, 54.
Parnacott, 59.
Gale and Boyden, 63.
Thomson and Watson, 88.
Ingram, 89.
Young, 94.
Dunbar and Lethrop, 99.

Partially cutting to produce ribbed appearance;
Broadhurst, Swindells, and Karshaw, 41.

Preparing by puncturing;
Stocker, 19.
Hunt (*Haskins*), 25.
Broadhurst, Swindells, and Karshaw, 41.
Johnson, (*Murfey*), 49.

Ribbed appearance:
Macintosh and Boggett, 6.

Solvents, &c.

Alcohol used in conjunction with;
Jeyes, 7.
Sintzenich (*Reed*), 9.
Warren, 52.

Benzine or benzole;
Sintzenich (*Reed*), 9.
Forster and Heartfield, 28.
Johnson (*Smart*), 61.

Solvents, &c.—*cont.*

Camphine;

Mayall, 20.

Mayall, 21.

Mac Cartney, 45.

Camphor;

Mac Cartney, 45.

Carbon, bi-sulphate of;

Wadsworth, 18.

Deiss and Scaife, 105.

Stewart, 108.

Carbon, bi-sulphuret of;

Sintzenich (*Reed*), 9.

Carbon, sulphuret of;

Guenin (*Rigollot*), 2.Tongue (*Montauté and Brandely*), 93.

Hydrocarbons generally;

Newton (*Macbay*), 100.

Deiss and Scaife, 105.

Naphtha;

Guenin (*Rigollot*), 2.

Quin, 4.

Wadsworth, 18.

Mayall, 20.

Wilkinson and Boss, 35.

Smith and Challenger, 36.

Warren, 53.

Walker, 53.

Myerns, 65.

Macintosh and Boggett, 69.

Frankenburg, 84.

Oils (coal tar);

Quin, 4.

Oils (essential);

Deiss and Scaife, 105.

Petroleum spirit;

Guenin (*Rigollot*), 2.

Tandy, 5.

Jeyes, 7.

Sulphuric ether;

Johnson (*Smart*), 61.

Turpentine;

Gedde (*Crossières*), 38.Thamsen (*Sörensen*), 42.

Myerns, 65.

Newton (*Macbay*), 100.

Solvents, recovering:

Wadsworth, 18.

Moseley, 67.

Moseley, 74.

Barrow, 68.

Moseley, 101.

Deiss and Scaife, 105.

Sponge or porous india-rubber
or gutta percha:

Forster and Heartfield, 26.

Forster and Heartfield, 28.

Sterne, Jaques, and Fan-
shawe, 31.Straining and filtering. *See*
Preparing, &c.

Substitutes for gutta percha:

Don and Wright, 65.

Rolls, 68.

Conybeare and Naphegyi, 85.

Lake (*Bell*), 83.Lake (*Bell*), 91.Newton (*Macbay*), 100.

Substitutes for india-rubber:

Lake (*Day*), 8.

Day, 29.

Day, 54.

Gale and Boyden, 63.

Rolls, 68.

Conybeare and Naphegyi, 85.

Lake (*Bell*), 83.Lake (*Bell*), 91.

Greening, 94.

Newton (*Macbay*), 100.Thread and string of gutta
percha, india-rubber, &c.:

Crossley, 2.

Hamer, 4.

Coles, Jaques, and Fan-
shawe, 16.

Turner, 36.

Turner, 37.

Harris, 76.

Gilbee (*Boëthius*), 62.Tubing, hose, &c., apparatus
for, and mode of making:

Quin, 4.

Luyckx, 5.

Hamer, 7.

Lake (*Torrey*), 8.

Poisnel, 13.

Mayall, 21.

Bates, Bates, and Faulkner,

23.

Forster and Cow, 32.

Moulton, 42.

Spill, 48.

Quin and Eastham, 51.

Sutherland, 53.

Harris, 55.

Lake (*De Wolfe*), 60.

Quin, 72.

Harrop, 75.

Harris, 76.

Tubing, hose, &c.—*cont.*

Turner (*Righter*), 78.
Dodge, 78.
Harris, 80.
Quin, 81.
Pieri, 87.
Quin, 90.

Uniting or joining india-rubber or gutta percha:

Tandy, 5.
Gray, 17.
Forster and Heartfield, 28.
Myerns, 65.

Vulcanite:

Colouring;
Henderson, 93.
Woodward (*Lippincott*), 102.

Cutting screws of in lieu of moulding;
Greenacre, 90.

Hardening;
Ryding, 1.

Preparing;
Tandy, 5.
Pigott, 9.

Shaping and moulding into pens;
Baker, 62.

Substitutes for;
Jenks, 99.
Conybeare and Naphegyi, 85.

Uniting broken dough for;
Tandy, 5.

Vulcanizing, apparatus for and mode of:

Tandy, 5.
Gray, 17.
Gray and Hawkins, 28.
Gray, 32.
Jackson, 41.
Harris, 62.
Jamieson, 76.
Young, 94.
Mori, 99.
Lake (*Grasser*), 103.

Washers and discs:

Cutting;
Grether and Bailey, 10.
Ingram, 87.

Embossing;
Coles, Jaques, and Fanshawe, 15.

Material for;
Talling and Seccombe, 88.
Ingram, 89.

Moulding;
Harris, 67.

Preparing sheet rubber for;
Stocker, 19.
Harris, 76.

Waste india - rubber, gutta percha, &c, utilizing:

Poisnel, 14.
Turner, 36.
Turner, 37.
Mac Cartney, 45.
Heinzerling and Liepmann, 97.

ERRATA.

Page 10, lines 2 and 3, for "bisulpheret" read "bisulphuret."

" 39, for "TRUEMAN" read "TRUMAN."

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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 Birkenhead (*Literary and Scientific Society*).
 Birmingham (*Free Library and News Room, Gosta Green*). — (*Graham Street Institution*).
 Bodmin (*Literary Institution*).
 Bolton (*Mechanics' Institute*).
 Bournemouth (*Library and Reading Room*).
 Bradford, Yorkshire (*Church Institute*).
 — (*Library and Literary Society*). — (*Mechanics' Institute*).
 Braintree (*Braintree and Bocking Literary and Mechanics' Institution*).
 Brampton, near Chesterfield (*Local Museum and Literary Institute*).
 Breage, Cornwall (*Institution*).
 Briggs, Lincolnshire (*Reading Society*).
 Bristol (*Athenæum*).
 — (*Institution*).

Bristol (*Law Library Society*).
 — (*Museum and Library, Queen's Road*).
 Bromsgrove (*Literary and Mechanics' Institute*).
 Burnley (*Literary Institution*).
 — (*Mechanics' Institution*).
 Burslem (*Wedgwood Institute*).
 Bury (*Athenæum*).
 Bury St. Edmund's (*Athenæum*).
 — (*Mechanics' Inst.*).
 Calne (*Literary Institution*).
 Canterbury (*Westgate Towers*).
 Carharrack (*Literary Institute*).
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 Chertsey (*Literary and Scientific Institution*).
 Chester (*City Library and Reading Room*).
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 Chippenham (*Literary and Scientific Institution*).
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 Diss (*Reading Room and Library*).
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 — (*Young Men's Christian Association*).
 Dorchester (*County Museum and Library*).
 — (*Working Men's Institute*).
 Dudley (*Mechanics' Institution*).
 Dukinfield (*Village Library and Reading Room*).
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 Dunfermline (*Carnegie Free Library*).

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 East Retford (*Literary and Mutual Improvement Society*).
 Ebbw Vale (*Literary and Scientific Institute*).
 Eccles, near Manchester (*Provident Industrial Co-operative Society*).
 Edinburgh (*Advocates Library*).
 — (*Association of Science and Art*).
 — (*Philosophical Institution*).
 — (*Royal Scottish Society of Arts*).
 — (*Watt Institution and School of Art*).
 — (*Working Men's Club*).
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 Egremont (*Mechanics' Institute*).
 — (*Workmen's Institute*).
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 — (*Devon and Exeter Institution*).
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 Faversham (*Institute*).
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 — (*Mechanics' Institute*).
 Gainsborough (*Literary, Scientific and Mechanics' Institute*).
 Garforth, near Leeds (*Working Men's Club*).
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 — (*Central Working Men's Club and Institute*).
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 Holbeck (*Mechanics' Institution*).
 Hollingwood (*Working Men's Club*).
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 Huddersfield (*Mechanics' Institution*).
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 — (*Young People's Institute*).
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 Inverness (*The Free Library*).
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 — (*Highgate Mechanics' Inst.*).
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 — (*Holbeck Branch Library*).
 — (*Hunslet Branch Library*).
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 — (*Philosophical and Literary Society*).
 — (*Working Men's Institute*).
 — (*Young Men's Christian Association*).
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 Leicester (*Law Society*).
 Leighton Buzzard (*Working Men's Mutual Improvement Society*).
 Leith (*Mechanics' Subscription Library*).
 Lewes (*Fitzroy Memorial Library*).
 — (*Mechanics' Institute*).
 — (*School of Science and Art*).
 Lincoln (*Mechanics' Institute*).
 Liverpool (*Institute*).
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 — (*Working Men's Club and Institute, Battersea*).
 — (*Working Men's Club and Institute Union, Strand*).
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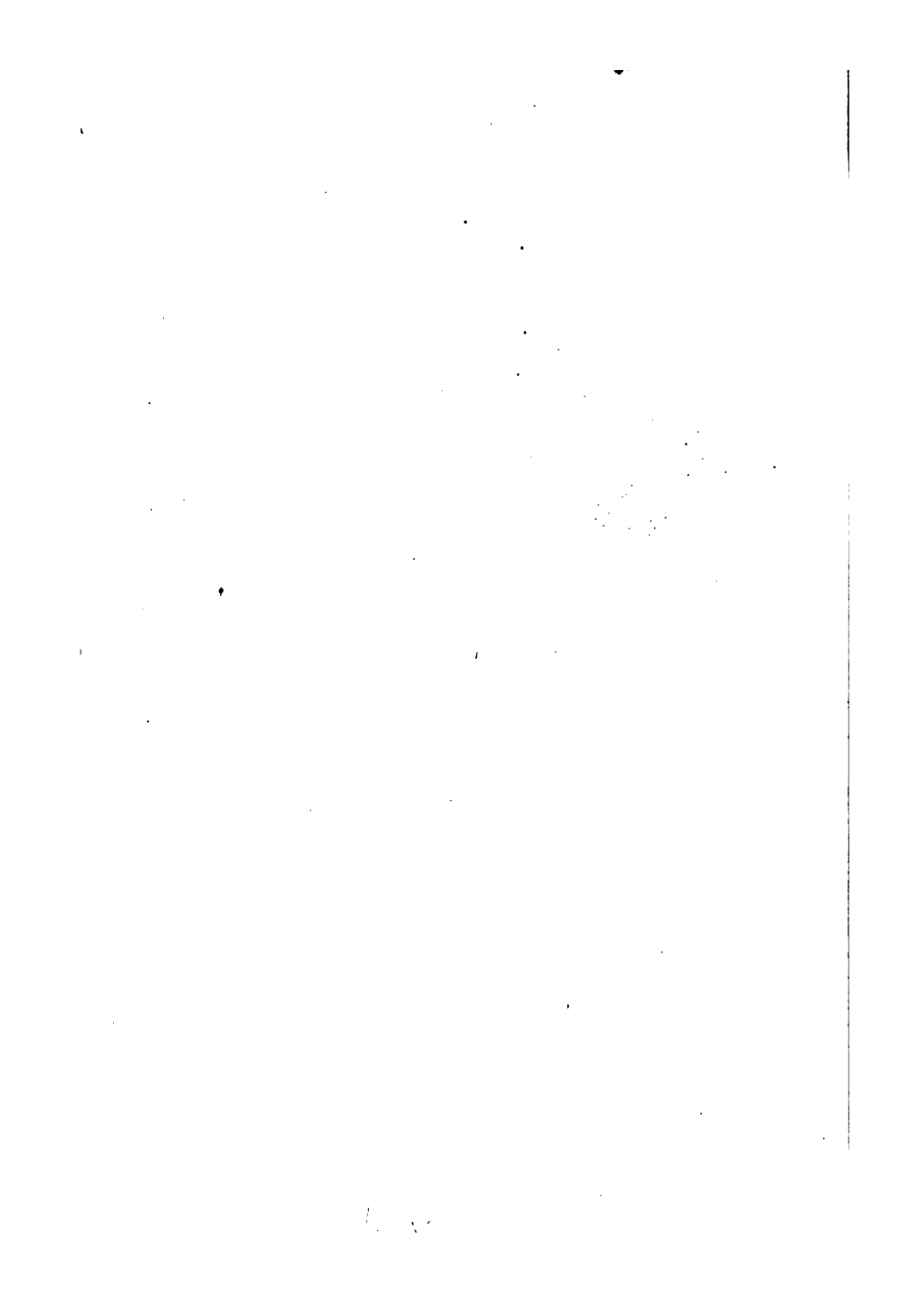
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